

SPECIFICATIONS FOR

Escambia Westgate Adaptive Play Facility

October 28, 2019

GEORGE KOPER ASSOCIATES, PA
3001 North 12TH Avenue
Pensacola, Florida 32503
(850) 435-1515

CIVIL
KENNETH HORNE AND ASSOCIATES
7201 North Ninth Avenue, Suite 6
Pensacola, Florida 32504
(850) 471-9005

STRUCTURAL
RAC ENGINEERING, INC.
129 Highpoint Drive
Gulf Breeze, Florida 32561
(850) 712-8290

MECHANICAL/PLUMBING/FIRE PROTECTION
Watford Engineering, Inc.
4471 Clinton Street
Marianna, Florida 32446
(850) 526-3447

ELECTRICAL
Adams Consulting Engineering, Inc.
3 West Garden Street, Suite 608
Pensacola, Florida 32502
(850) 444-0095

TELECOMMUNICATION
Premier Engineering Group, LLC
410 West Nine Mile Road
Pensacola, Florida 32534
(850) 469-0405

AUDIO VISUAL
Walthall and Associates, Inc.
200 Swift Creek Drive, Suite G
Cantonment, Florida 32533
(850) 478-9002

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NOTICE TO CONTRACTORS

Sealed bids to be filed with the Escambia County School District in the office of Facilities Planning, Room 158; 30 East Texar Drive, Pensacola, FL 32503, will be publicly opened and evaluated by the Escambia County School District in the Conference Room located in Facilities Planning on the date and times listed below for the construction of the following project: **ESCAMBIA WESTGATE ADAPTIVE PLAY FACILITY**. Plans and specs can be ordered from Bay Area Blueprint reprographics company Pensacola office at 700 S Pace Blvd, Pensacola, Florida 32502 at the contractor's own expense. Contact them at (850) 433-6864 or plot@bayareablue.com. It is the contractor's responsibility to receive ALL drawing sheets, specification sections and any addenda for a complete description of the project scope. If there are any questions or concerns about the project documents on file at Bay Area Blueprint, please contact the Architect, George Koper Associates, PA at: 3001 North 12th Ave, Pensacola, Florida 32503; phone: 850-435-1515; or email: george@gkassoc.com.

Bid Opening, 21 NOV 2019, 2019, at 2:00 p.m., local (central) time. PLEASE NOTE, a **MANDATORY Pre-Bid Conference and site visit** will be held on **13 NOV, 2019, at 9:00 a.m.,** local (Central) time at the Westgate School, 10050 Ashton Brosnaham Road, Pensacola, FL 32534 (meet in front office)**.** A complete list of subcontractors to be used for these projects shall be submitted within twenty-four (24) hours after the bid date and time listed above to the Office of Facilities Planning, 30 East Texar Dr., Room 158, Pensacola, FL 32503. Attention: Anthony B. Noles, Director. Effective Sept. 1, 2005, the Contractor shall comply with all requirements of Sections 1012.32 and 1012.465, FL Statute, by certifying that all of its officers, agents or employees who may have direct contact with students or who come onto school property while students are present have completed the background screening required by the referenced statutes, and meet the standards established thereby. Effective June 1, 2002, only bids from Pre-qualified Contractors will be accepted. Any bid received after the above-mentioned date and time will not be considered. The Owner reserves the right to waive formalities in the bidding and reject any/and or all bids. Bid award recommendations to the Board are pending subject to final review and verification of required documents. **This notice is posted at the Facilities Planning website: http://ecsd-fl.schoolloop.com/fascplan.** The School District of Escambia County, Florida, Anthony B. Noles; Director, Facilities Planning.

INSTRUCTIONS TO BIDDERS

1. BID FORMS: The Proposal Form is included in these specifications. Separate Proposal Forms will be furnished to prospective bidders upon request.

   Bid documents shall be sealed and clearly labeled with the words "Bid Documents", the project name, name of bidder and date and time of opening so as to guard against premature opening of any bid.

   The Owner may consider as nonconforming any bid on which there is an alteration of or departure from the Proposal Form hereto attached.

   The Bid shall be based upon the completion of the Work according to the contract documents, together will all addenda thereto, under the lowest proposal submitted by a responsive bidder.

2. UTILIZATION OF SUBCONTRACTORS: ***A complete list of subcontractors to be used for this project shall be submitted within twenty-four (24) hours after the bid date and time listed on the Proposal Form to the office of Facilities Planning, Room 158, 30 East Texar Dr, Pensacola, FL,. Attention: Anthony B. Noles, Director.*** Licensure of subcontractors is specified under paragraph 3.

3. LICENSURE: In accordance with Chapter 489.113, Florida Statutes, all individuals or entities engaging in and providing construction services shall be licensed in the State of Florida for that activity. This license requirement includes general and sub-contractors.

   The successful low bidder shall be required to submit a current license certificate and a list of all contractors to be involved in said project with applicable license numbers (see form included in these documents), including a photographic copy of current license certificates. Submittal of proof of license shall be made with, and as a part of signed contract.

   Failure to submit required proof of license shall be cause for Owner to reject bid as non-responsive, and award bid to second lowest qualified bidder.

4. INTERPRETATION: No oral interpretation will be made to any bidder as to the meaning of the drawings or specifications. Every interpretation made to a bidder will be in the form of an addendum to the specifications. Addenda will be furnished to each bidder, but it shall be the bidder's responsibility to make inquiry as to addenda issued. All such addenda shall become part of the contract and all bidders shall be bound by such addenda whether or not received by the bidders.

5. FAMILIARITY WITH LAWS: It is the bidder's responsibility to be familiar with all Federal, State and local laws, ordinances, rules and regulations that in any manner, affect the work. Ignorance thereof on the part of the bidder will in no way relieve him from responsibility.

6. **PERMITS AND INSPECTIONS**: **It is the bidder's responsibility to obtain and pay the cost of necessary permits and inspections from either the County or City Building Inspection departments**.

7. EXAMINATION OF DOCUMENTS AND SITE: Before submitting his proposal, bidder shall visit the site of the proposed work and familiarize himself with the nature and extent of the work and any local conditions that may in any manner affect the work to be done and the equipment, materials, and labor required. He shall also examine the drawings, specifications, and other contract documents to inform himself thoroughly regarding any and all conditions and requirements that may in any manner affect the work to be performed under the contract.

8. RIGHT TO REJECT PROPOSAL: The Owner reserves the right to reject any or all proposals, to waive technical errors, and to accept any bids in part.

9. TIME OF COMPLETION: The successful bidder will be required to complete the project within the time stated in the Proposal Form and General Conditions. When projects are bid as a group, it is expected that the successful Contractor will have the manpower capabilities to complete all projects concurrently. A completion time listed in the Contract Documents is for completion of all projects unless specified otherwise.

10. FORM OF AGREEMENT: The Contract form shall be "Standard Form of Agreement between Owner and Contractor", AIA document A101 2017, available from the Facilities Planning Office, 30 East Texar Drive, Pensacola, Florida, 32503.

11. BID GUARANTEE: The bidder's proposal shall be accompanied by a bid bond, cashier's check or certified check in the amount of 5% of the total of the bid and drawn in favor of the Owner. Such bid bond or check is given with the understanding and agreement that it guarantees: (1) that the bidder will not withdraw his bid for period of 45 consecutive calendar days commencing from the next regularly scheduled Board Meeting without the consent of the Owner; (2) that, if his bid is accepted, the bidder will enter into the written Contract with the Owner and furnish the required insurance certificates, and insurance within 10 consecutive days after receipt of notice of acceptance of his bid. In the event the bidder fails to comply with any of these conditions and requirements in whole or in part, the full amount of the bond or check shall be automatically forfeited to the Owner as damages on account of the default of the bidder. Within seven days after formal opening of bids, bid bonds and checks shall be returned to all except the three lowest bidders. The bid bonds or checks of the lowest bidders will be returned within three days after the execution of the Contract and submission to and approval by the Owner of all documentation and executed bonds.

12. SECURITY: Where Contractor is required by the nature of the work to have access to the interior of the facility during hours when school personnel are not present on the site, the Contractor shall be responsible for maintaining building security, and the Contractor shall be responsible for replacement or repair of items and or equipment stolen, lost or damaged while the building security is under the care of the Contractor. The Contractor shall be responsible for having the job superintendent present wherever subcontractors are working in connection with the Contractor's basic contract.

13. SALVAGE: The Owner reserves the right/option to take possession of any items salvaged.

14. UTILITY SPOTTING: The Contractor shall employ the use of Ground Penetrating Radar Equipment to locate, identify and protect all underground utilities. This cost shall be in the base bid. Please refer to the Division of Trenching and Excavation.

END OF SECTION

PROPOSAL FORM

Escambia County School Board
Facilities Planning
30 East Texar Drive, Room 158
Pensacola, Florida 32503

Date_____

Time_____

Gentlemen:

The undersigned Contractor, hereinafter called "Bidder", proposes to furnish all labor and material for ESCAMBIA WESTGATE ADAPTIVE PLAY FACILITY for the Escambia County School Board, Pensacola, Florida, hereinafter called the "Owner", in accordance with the drawings and specifications and in full accordance with instructions to bidders, contract and construction documents relating thereto on file in the office of the Director of Facilities Planning for the sum of:

BASE BID _____DOLLARS ($_____)
(write out in text full amount)

ALLOWANCES INCLUDED IN BASE BID:

ALLOWANCE NO. 1: Fifty-seven thousand, four hundred ninety-seven dollars and no cents ($57,497.00)

Allowance No. 1 Description: Direct Digit Control System, see Section 01210 for a complete description.

ALLOWANCE NO. 2: Thirty thousand, one hundred twenty-seven dollars and forty cents ($30,127.40)
Allowance No. 2 Description: Multiplexed Intelligent Fire Alarm System, see Section 01210 for a complete description.

ALLOWANCE NO. 3: Thirty-seven thousand, three hundred twenty-six dollars and seventy-six cents ($37,326.76)
Allowance No. 3 Description: IP Security Integrator, see Section 01210 for a complete description.

ALLOWANCE NO. 4: Six thousand dollars and no cents ($6,000.00)
Allowance No. 4 Description: Three (3) Flat Panel TVs, see Section 01210 for a complete description.

ALLOWANCE NO. 5: Six hundred dollars and no cents ($600.00) per 1000 brick.
Allowance No. 5 Description: Brick allowance, see Section 01210 for a complete description.

ALLOWANCE NO. 6: Five thousand dollars and no cents ($5,000.00)
Allowance No. 6 Description: Vinyl Graphics, see Section 01210 for a complete description.

ALLOWANCE NO. 7: One thousand, five hundred seventy-eight dollars and eighty-three cents ($1,578.83)
Allowance No. 7 Description: Building Permit Fee, see Section 01210 for a complete description.

There is enclosed a Bid Bond in the amount of $_____ payable to the Owner, the required bid deposit, as a guarantee and for the purposes set out in the instructions to bidders.

A complete list of subcontractors to be used for this project shall be submitted within twenty-four (24) hours after the bid date and time listed above to the office of Facilities Planning, Room 158, 30 East Texar Dr, Pensacola, Fl. Attention: Anthony B. Noles, Director

The Bidder hereby agrees that the above proposal shall remain in full force and effect for a period of forty-five (45) calendar days commencing from the next regularly scheduled Board Meeting and that the Bidder will not revoke or

cancel this proposal or withdraw from the competition within said forty-five (45) day period, and that in the event the contract is awarded to this Bidder, he will, within ten (10) consecutive calendar days after it is awarded, enter into written contract with the Owner in accordance with the accepted bid and give a contract performance bond with good and sufficient sureties satisfactory to the Owner in the amount of 100% of the accepted bid and give a payment bond in accordance with Florida Statute 255.05; and that in the event of Bidder's default or breach of any said agreement, said bid deposit shall be forfeited to Owner as liquidated damages.

The Bidder further agrees, that if awarded the contract, to substantially complete said work within **three-hundred sixty** (**360**) calendar days after date of written Notice to Proceed and finally complete work within **forty-five** (**45**) calendar days after Substantial Completion. Liquidated damages may be assessed against the final payment in the amount of **one-thousand** dollars (**$1000**) for each consecutive calendar day the Contractor is late in achieving Substantial Completion and **five-hundred** dollars (**$500**) for each consecutive calendar day the Contractor is late in achieving Final Completion.

Acknowledgment is hereby made of receipt of the following addenda issued during the bidding period:

Addendum No._____ Dated _____
Addendum No._____ Dated _____
Addendum No._____ Dated _____
Addendum No._____ Dated _____

Signature Block

Bidder: _____

By: _____

Title: _____

Date:_____

Required Documents:
Contractor shall complete and submit with this proposal, the following attached documents (one original - signed and dated) entitled:

a. Public Entity Crimes Statement
b. Trench Safety Addendum
c. Certification Regarding Debarment
d. Non-Collusion Affidavit

END OF SECTION

SWORN STATEMENT PURSUANT TO SECTION 287.133(3)(a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN TO IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to The School District of Escambia County

by _____
(print the individual's name and title)

for_____
(print name of entity submitting sworn statement)

whose business address is_____

_____

and (if applicable) its Federal Employer Identification Number (FEIN) is:

_____

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement:_____

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to an directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to changes brought by indictment or information after July 1, 1997, as a result of a jury verdict, non jury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

    1. A predecessor or successor of a person convicted of a public entity crime; or
    2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 287.133(1)(e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. (Indicate which statement applies)

_____ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1997.

_____The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public crime subsequent to July 1, 1997.

_____The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1997. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and Final Order entered by the Hearing Officer determined that is was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. (Attach a copy of the final order)

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH I (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES FOR A CATEGORY TWO OF ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

_____

(Signature)

Sworn to a subscribed before me this _____ day of_____ in the year 20_____.

Personally known _____

OR produced identification_____ Notary Public-State of_____

_____ My commission expires_____

(Type of Identification)

_____

(Printed typed or stamped commissioned name of notary public)

TRENCH SAFETY ADDENDUM

Any trench safety excavation having a depth in excess of five (5) feet will be subject to the Excavation Safety Standards established by the Occupational Safety and Health Administration, 29.C.F.R. s. 1926.650 Subpart P.

By the signature of its undersigned authorized representative, the Bidder hereby assures the Owner that any such excavation performed by the Bidder will be performed in compliance with all applicable trench safety standards.

The cost of compliance with applicable trench safety standards is to be included in the amount of base bid.

The specific methods of compliance with applicable Trench Safety Standards, and the cost of compliance are as follows:

_____**AUTHORIZED OFFICIAL SIGNATURE**

By Authorized Representative of the Contractor:

_____

(Printed Name)

_____

(Signature)

Date: _____

Revised 1/5/2012

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION – LOWER TIER COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Executive Order 12689, and 31 U.S.C. 6101; Debarment and Suspension, 2 CFR Part 417, Subpart C, Responsibilities of Participants Regarding Transactions Doing Business with Other Persons.

(Please read instructions below before completing Certification)

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

_____

ORGANIZATION NAME SPONSOR AGREEMENT NUMBER OR PROJECT NAME

_____

NAME(S) AND TITLE(S) OF AUTHORIZED REPRESENTATIVE(S)

_____

SIGNATURE(S) DATE

1. By signing and submitting this form, the prospective lower tier participant is providing the certification above in accordance with these instructions.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms " covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

NON-COLLUSION AFFIDAVIT

STATE OF _____ COUNTY OF _____

BID PROJECT: _____

COMPANY NAME: _____

_____being first duly sworn, deposes and says that:

BIDDER is the

_____,
(Owner, Partner, Officer, Representative or Agent of Company)

BIDDER is fully informed respecting the preparation and contents of the Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said BIDDER nor any of its officers, partners, owners, agents, representative, employees or parties in interest, including this affidavit, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other BIDDER, firm or person to submit a collusive or sham Bid in connection with the Contract for which the above Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communications, or conference with any BIDDER, firm, or person to fix the price or prices in the above Bid or any other BIDDER, or to fix any overhead, profit, or cost element of the Bid Price or the Bid Price of any other BIDDER, or to secure through any collusion conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;

The price of items quoted in the above Bid are fair and proper and are not tainted by collusion, conspiracy, connivance, or unlawful agreement on the part of the BIDDER or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

By _____

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
Notary Public (Signature)

My Commission Expires:

_____

OWNER-CONTRACTOR AGREEMENT

LIST OF SUBCONTRACTORS

(To be submitted with signed contract, insurance and bond documents) Date: _____

This list is an attachment to and an integral part of Owner-Contractor Agreement

Name and address of Contractor:_____

For the Construction of:_____

The undersigned, hereinafter called "Bidder", list below the names of the subcontractors who will perform the phase of work indicated:

Division Of Contract	**Name and Address of Subcontractor**	**Subcontractor Certification Or Registration Number**
Sitework		
Masonry		
Concrete		
Flooring		
Casework/Cabinetry		
Painting		
Plumbing		
Mechanical		
Fire Sprinkler		
Electrical		
Roofing		
Structural Steel		
Communication/Data		
Fire Detection/Alarm		

The undersigned declares that he has fully investigated each subcontractor listed and has received and has in his files evidence that each subcontractor maintains a fully equipped organization capable, technically and financially, of performing the pertinent work, and that he has made similar installations in a satisfactory manner. Attached herewith are photographic copies of each listed contractor's current license(s) applicable to the service to be provided under this contract for construction. (A false or inaccurate certification will be deemed to be a material irregularity and will be grounds for rejection of a bid, at the option of the Owner.

(CONTRACTOR'S SIGNATURE) *(DATE)*

ESCAMBIA COUNTY SCHOOL DISTRICT

SUPPLEMENTARY GENERAL AND SPECIAL CONDITIONS OF CONTRACT FOR CONSTRUCTION

SECTION 1A

1A.1 GENERAL CONDITIONS: "General Conditions of the Contract for Construction", 2017 Edition, Articles 1 through 15 inclusive, AIA Document A201, except as amended herein, shall by reference be made a part of these specifications.

1A.2 DEFINITIONS: The School Board of Escambia County, Florida - the Owner of facilities and property within the jurisdiction of the Escambia County, Florida School District. Also referred to as "Board" or "School Board".

1A.3 SPECIFICATIONS DIVISIONS: The specifications are divided into headings for the convenience of the Contractor. The Contractor shall, however, be held to the furnishing of a complete building according to the meaning and intent of the drawings and specifications whether all of the items involved under any trade are mentioned in one or several headings.

1A.4 CONTRACTOR'S INSURANCE: Article 11, "Insurance", of the General Conditions shall be amended and supplemented as follows:

A. Contractor shall not commence work under this contract until he has obtained all insurance required under this paragraph, certificates of insurance have been submitted, and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. The successful Contractor shall be prepared at the time of contract award to provide the Board with an insurance policy number. Failure on the part of the Contractor to provide this policy within 10 working days of award of contract could result in withdrawal by the Owner of the award of the bid.

B. COMPENSATION INSURANCE: Contractor shall take and maintain during the life of this contract, Workers' Compensation Insurance for all of his employees, employed at the site of the project. In case any work is sublet, Contractor shall require subcontractor similarly to provide Workers' Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the Contractor. If any employee is engaged in hazardous work under this contract at the site of the project is not protected under the Workers' Compensation statute, the Contractor shall provide and shall cause each subcontractor to provide adequate insurance, satisfactory to Owner, for the protection of his employees not otherwise protected. Policy shall be in compliance with Chapter 440, Florida Statutes. Worker's Compensation shall include employer's liability in an amount of not less than $100,000 each accident; $500,000 disease policy limit; and $100,000 disease - each employee. ***No "Exemptions" to Workers' Compensation Insurance coverage shall be accepted. The coverage described herein shall be considered minimum requirements.***

C. COMPREHENSIVE PUBLIC GENERAL LIABILITY INSURANCE: Contractor shall purchase and maintain during the life of this contract, public liability insurance against bodily injury, personal injury, property damage which shall include comprehensive general liability, contractual liability, products and completed operations liability in limits of not less than $1,000,000 per occurrence ***and $2,000,000 Aggregate.*** The contract shall protect him and any subcontractor performing the work covered by this contract, from claims for damages, which may arise from operations under this contract, whether such operations are by himself or by any subcontractor, or by anyone directly, or indirectly employed by either of them. The Contractor shall indemnify and hold harmless the Owner against any and all claims for personal injuries and/or property damage as a result of Contractor's ***and its Sub-Contractor*** acts, operations, or omissions and shall carry contractual liability and property damage insurance to cover such

indemnification. The limits of contractual coverage shall agree with the limits stated above for Contractor's regular public comprehensive general liability coverage and property damage.

1A.4 CONTRACTOR'S INSURANCE: CONTINUED

D. AUTOMOBILE LIABILITY INSURANCE: The Contractor shall maintain automobile liability insurance against bodily injury and property damage in the amount of $500,000 per occurrence. The Board shall be name as an additional insured on the automobile policy.

E. OWNER'S AND CONTRACTOR'S PROTECTIVE LIABILITY INSURANCE: Contractor shall purchase and maintain during the life of this contract Owner's and Contractor's Protective Liability Insurance in the **name of The School Board of Escambia County, Florida** and the amount of insurance shall be in limits of not less than $500,000 per occurrence.

F. ADDITIONAL INSURED CLAUSE: The School Board of Escambia County, Florida shall be added as an additional insured on all Contractor's liability policies.

G. BUILDER'S RISK INSURANCE: Contractor shall furnish an All Risk, 100% Completed Value Builder's Risk Policy on the subject. Policy coverage shall include fire, extended coverage, vandalism and malicious mischief. The policy shall be increased in value any time a change order increases the cost of the project. The insured shall include the Escambia County School Board and subcontractors in addition to the General Contractor. The policy shall remain in effect until Substantial Completion of the project.

H. All policies shall contain a requirement that the Board will be notified of cancellation forty-five (45) days prior to the cancellation of policies by return-receipt, certified mail and that no other form of notification will otherwise relieve the insurance company, its agents, or its representatives of responsibility.

1A.5 PERFORMANCE BOND AND LABOR & MATERIAL PAYMENT BOND: Paragraph 11.4 of the General Conditions is supplemented as follows:

The Owner will require the Contractor to furnish both a performance bond and a labor and material payment bond (two separate bonds) in the amount of not less than 100% of the contract price for each type of bond, covering faithful performance of the contract and the payment of all obligations arising thereunder in such forms as the Owner may prescribe and with such securities as he may approve. The premiums for the required bonds shall be paid by the Contractor. The performance and payment bond shall follow the general form and include coverage as described in Florida Statute 255.05.

1A.6 PERMITS: Paragraph 3.7.1 of the AIA Document A201 "General Conditions of the Contract for Construction: 2017 Edition". The Contractor shall be responsible to obtain and pay for all required permits from the authority having jurisdiction. The cost of such permits shall be included in the base bid.

1A.7 LABOR: All Contractors and subcontractors employed under the work shall and will be required to conform to the Labor Laws of the State of Florida and the various Acts amendatory and supplementary thereto; and to all other laws, ordinances, and legal applicable thereto. All labor shall be performed in the best and most workman like manner by mechanics skilled in their respective trades.

1A.8 PRECONSTRUCTION CONFERENCE AND NOTICE TO PROCEED: After all required paperwork has been completed and a contract is signed by both parties, a preconstruction conference may be scheduled. The date construction will commence will be established at the time of the conference. No activity in relation to the construction of the project shall be performed prior to issuance of the Notice to Proceed. The Contractor shall notify the office of the Director of Facilities Planning when starting construction.

1A.9 TEMPORARY LIGHT AND POWER: The Contractor shall furnish all temporary light and power complete with all wiring, lamps and similar equipment, as required for the completion of the work. The Contractor shall pay for all current for all temporary lighting for all trades.

1A.10 MATERIALS: When several materials are specified by name for one use, the Contractor may select for use any of those so specified. Whenever "or approved equal" is indicated, items proposed for use shall be submitted for Architect's approval. Wherever an item or class of material is specified exclusively by trade name or by name of the maker or by catalog reference, only such items shall be used.

1A.11 SHOP DRAWINGS: Shop drawings shall be submitted for manufactured or fabricated materials and equipment as called for in the various sections of the specifications, showing dimensions, materials, design data, finishes, quantities, installation methods and other pertinent data. Submit at least five copies of each item soon enough to allow reasonable time for checking by the Architect.

1A.12 SANITARY PROVISIONS: The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the regulations of the Florida State Board of Health. No nuisance will be permitted.

1A.13 CONTRACTOR'S FIELD OFFICES: Trailers may be used for field offices, but their use as living quarters for personnel shall be limited to one staff member such as a night watchman or superintendent. Contractor shall provide suitable space in his field office, or in a separate unit, for the Architect and his representative.

1A.14 WATER FOR CONSTRUCTION: The Contractor shall obtain and pay for all water used during construction, including cost of temporary lines and hose bibs.

1A.15 GRADES LINES AND LEVELS: The Contractor shall verify all grades, lines, levels and dimensions as shown on the drawings and shall report any errors or inconsistencies in the above to the Architect before commencing work.

1A.16 SCHEDULE OF VALUES: Within ten (10) days after receipt of signed Contract, the Contractor shall submit to the Architect/Engineers and the Director of Facilities Planning a correct, complete, itemized schedule of the different materials or subdivisions of the contracted work, giving quantities and costs for labor and materials. Each item shall include its due proportion of expense and profit, all arranged in a satisfactory form. Total of all items shall equal the total contract sum.

1A.17 PROGRESS CHART: Within ten (10) days after receipt of signed contract Contractor shall file with the Architect a progress chart showing the order in which the Contractor proposes to begin the various parts of the work and the dates he contemplates completing them. Progress chart shall be updated at request of Architect/Owner and when completion date changes.

1A.18 TIME FOR COMPLETION: Time for Substantial Completion of all work included in this contract shall not exceed **three-hundred sixty** (**360**) calendar days from date of written Notice To Proceed. Final Completion shall be achieved not later than forty-five (45) calendar days after Substantial Completion. The number of days allowed includes an allowance for calendar days missed due to weather. No extension of time will be allowed for delays due to weather. No work is to begin on this project until a "Notice to Proceed" is issued by the Owner, Architect or Engineer.

1A.19 LIQUIDATED DAMAGES: Since actual damages for any delay in completion of the work are impossible of determination, the Contractor and his sureties may be liable for, and may pay to the Owner, as liquidated damages, the amount of **one-thousand** dollars ($**1,000**) for each consecutive calendar day the Contractor is late in achieving Substantial Completion and **five-hundred** dollars ($**500**) for each consecutive calendar day the Contractor is late in achieving Final Completion. Substantial completion shall be the date on which the construction is sufficiently completed and approved in accordance with the plans and specifications, including change orders, so that the Owner can occupy and utilize the building for the use for which it is intended.

1A.20 ARBITRATION: General Conditions of the Contract for Construction, AIA Document A201, 2017 Edition, Article 15, section 15.4 "Arbitration" shall be deleted in its entirety as approved by the School Board on May 16, 2000.

1A.21 CHANGES IN WORK (CHANGE ORDERS): Maximum percentages of overhead and profit which may be added by the Contractor to **proposed** costs of such changes in the work are specifically set forth as follows:

For all work done by the General Contractor: Contractor may add up to 15% of **proposed** costs for combined overhead and profit.

For all work done by subcontractors to the General Contractor: subcontractors may add up to 10% of **proposed** costs for combined overhead and profit, and the General Contractor may add up to 5% of the above subcontractor's cost for his overhead and profit or a total of 15% overhead and profit.

A bond cost of 1% of the total amount of the added costs will be allowed the Contractor as a legitimate item of cost, and 1% of all credit amounts shall be added to the total credit allowed the Owner. No bond cost shall be allowed for subcontractor's bond cost.

The above percentages shall be considered reasonable allowance for overhead and profit due to the Contractor.

The Contractor shall submit receipts or other evidence showing his costs and his right to the payment claims.

Labor costs shall include supervision, estimation, layout, mechanic's and laborer's wages including payroll taxes and assessments and insurance premiums.

Material, equipment and equipment rental costs shall be the trade discount costs plus state sales tax where applicable.

The Contractor shall utilize the Owner's standard Change Order Forms found at the end of this section (no substitutions).

1A.22 LEGAL NOTICE OF COMPLETION: In accordance with Rule 6GX17-3.15 (2)(d) School District Rules, when projects have been completed and are ready for acceptance, an advertisement must be published in the local newspaper before final payment is made. Example of such publication is as follows:

> Notice is hereby given that the undersigned Contractor has completed and has ready for acceptance by the School Board of Escambia County, Florida, the following construction project:
>
> _____
>
> _____
>
> *(Legal name - entity of the Contractor)*

1A.23 WARRANTIES AND OPERATING INSTRUCTIONS: Where guarantees are required, secure warranties, countersign and deliver to Director of Facilities Planning prior to request for final payment. Contractor warrants all work performed by him directly and all work performed for him by others. Except where longer periods are specified, all materials, equipment and workmanship incorporated in the work shall be guaranteed for a period of one (1) year from date of final acceptance. Any work, material or equipment which during the guarantee period is, in the opinion of the Director, defective or inferior and not in accordance with the drawings and specifications shall be made good at no additional cost to the Owner, including any other work which may have been damaged because of such

deficiencies. The Contractor shall be the contact person and the person responsible for coordinating all warranty work for the Owner. "Warranty Request" form included in the specifications. The Contractor will respond within the time stated in the request and provide written confirmation of action taken by filling out the bottom and returning the warranty request form for the Maintenance Department. If no action is taken or there is a delay in performing the warranty work, so state and return form within the time frame indicated on the form.

1A.24 LICENSE REQUIREMENTS: In accordance with Chapter 489.113, Florida Statutes, anyone engaging in the business of contracting in the state shall be licensed. Contractors shall furnish proof of current license before contract is awarded by the School Board.

1A.25 ASBESTOS AND ASBESTOS-BEARING MATERIALS: No asbestos or asbestos-bearing materials in any form shall be used in the construction of this facility. In demolition work of existing facilities, if the Contractor encounters asbestos or asbestos-bearing materials he shall immediately cease all activities, remove personnel from the site, and notify the Architect. Work shall not resume until all asbestos and asbestos-bearing materials have been removed and the Contractor is notified that work can proceed.

1A.26 EQUAL EMPLOYMENT OPPORTUNITY (ESCAMBIA COUNTY)

CONTRACTOR'S EMPLOYMENT POLICY

A. The Contractor and all Subcontractors shall not discriminate against any employee or the applicant for employment because of race, religion, color, sex, national origin or age. The Contractor shall take affirmative actions to insure that applicants are employed, and the employees are treated during employment without regard to their race, religion, color, sex, national origin or age. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertisement; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

B. The Contractor and all 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, religion, color, sex, national origin or age.

1A.27 CONTRACTORS AND SUBCONTRACTORS BACKGROUND SCREENING (JESSICA LUNSFORD ACT)

A. The School District requires that all contractors and subcontractors comply with the Jessica Lunsford Act, §1012.465, F.S. and with School Board Rule 5.12. For more information regarding background screening, please visit the following web page (ctrl + click to follow link):

http://ecsd-fl.schoolloop.com/fingerprint

Scroll down to the middle of the page for information regarding contractors/vendors.

B. To inquire about the credentialing process, please call the Security Credentials Office at (850) 430-7687.

1A.28 STANDARD ATTACHMENT FOR PRE-APPROVED CONSTRUCTION AND ARCHITECT/ENGINEERING CONTRACTS

The Contractor shall comply with all requirements of Sections 1012.32 and 1012.465, *Fla. Stat.,* by certifying that all of its officers, agents or employees who may have direct contact with students or who come onto school property while students are present have completed the background screening required by the referenced statutes, and meet the standards established thereby. This certification will be provided to the School District's Facilities Planning Department in advance of the Contractor providing any services on school property while students are present.

The Contractor will bear the cost of acquiring the background screening and any fee imposed by the Florida Department of Law Enforcement to maintain the fingerprints provided with respect to the Contractor, its agents and its employees.

The Contractor will provide the School District's Facilities Planning Department a list of its employees who have completed background screening and who meet the referenced statutory requirements. The Contractor will update these lists in the event that any employee listed fails to meet the statutory standards or new employees who have completed the background check and who meet the standards are added.

Under no circumstances shall the Contractor permit any of its officers, agents or employees to come onto school property when students are present if they have either not undergone the background screening or if they have been found guilty of a disqualifying offense pursuant to Section 435.04, *Fla. Stat.,* regardless of whether adjudication was withheld or if the finding of guilt was pursuant to a plea or after trial. The Contractor agrees that in the event any employee whom the Contractor has certified as completing the background check and meeting the statutory standards then is convicted of any disqualifying offense, the Contractor will notify the School District's Facilities Planning Department within 48 hours of such.

The parties agree that in the event that the Contractor fails to perform any of the duties described in this paragraph, this will constitute a material breach of the contract entitling the School Board to terminate immediately with no further responsibility to make payment or perform any other duties under this contract. The Contractor agrees to indemnify and hold harmless the School Board, its administrators and any and all of its employees from any liability in the form of physical injury, death, or property damage resulting from the Contractor's failure to comply with the requirements of this paragraph or Sections 1012.32 and 1012.465, *Fla. Stat.*

SECTION 2A

2A MINORITY/SMALL BUSINESS ENTERPRISE
SUBCONTRACTOR PARTICIPATION (GOALS) REQUIREMENTS

School District of Escambia County: Utilization of M/SBE Contractors is a voluntary program as relates to the District. As such, all compliance with this program is at the discretion of the School District. Given these circumstances, full compliance with the requirements and goals of this section does not guarantee contract award, but preference only.

2A.1 DEFINITIONS

2A.1.1 The following terms shall have the listed meanings (the definitions shall not apply outside of this Section where inconsistent with those listed elsewhere in the Bid Documents or Contract Document).

2A.1.1.1 Contractor: An individual, firm, partnership, corporation or combination thereof submitting a bid for the work as Prime Contractor.

2A.1.1.2 A Subcontractor is a person or entity that has a direct contract with the Contractor to perform a portion of the Work at the site.

2A.1.1.3 SMALL BUSINESS: an independently owned and operated business concern which employs 25 or fewer permanent full-time employees and which as a net worth of not more than $1 million. As applicable to sole proprietorships, the $1 million net worth requirement shall include both personal and business investments.

2A.1.1.4 Minority Business Enterprise:

A. "Minority Business Enterprise" means any small business concern as defined in 2A.1.1.3 which is organized to engage in commercial transactions, which is domiciled in Florida, and which is at least fifty-one percent (51%) owned by minority persons and whose management and daily operations are controlled by such persons. A minority business enterprise may primarily involve the practice of a profession.

B. "Minority Person" means a lawful, permanent resident of Florida who is:

1. A Black American, a person having origins in any of the black racial groups of Africa;

2. An Hispanic American, a person of Spanish or Portuguese culture with origins in Mexico, South America, Central America, or the Caribbean regardless of race;

3. An Asian American, a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands;

4. A Native American, a person who is a member of, or is eligible to be a member of, a federally recognized Indian Tribe;

5. An American Woman;

6. A physically disabled person, a person who has a physical impairment, defect, disease, ailment, or disability of a permanent nature which in any way limits the type of employment for which the person would otherwise be qualified.

2A.1.1.5 M/SBE Subcontractor List: To aid Contractors, a list of Certified M/SBE Subcontractors, is maintained by and available from the M/SBE Coordinator. This list represents only the subcontractors that have been certified by the School Board of Escambia County as meeting the requirements for participation as a Certified M/SBE Subcontractor as listed below.

2A.1.1.6 M/SBE Minority Contractor Coordinator: An employee of the School Board of Escambia County, who is responsible for the coordination, implementation and monitoring of the M/SBE Program.

2A.1.1.7 M/SBE Subcontracting Goal: M/SBE Subcontractor participation goal established by the School Board of Escambia County for this project. This goal is voluntary and does not require a minimum percentage of participation by M/SBE subcontractors. This goal can be reasonably attained by means of applying every reasonable and sufficient effort to utilize M/SBE Subcontractors in the performance of Work under this Project and in accordance with the terms and requirements of this Section.

2A.1.1.8 Certified M/SBE Subcontractor: A Subcontractor who is certified to do specific work under the M/SBE Contractors Participation Program if he/she meets all the following criteria:

A. He/She maintains an Occupational License establishing the company as an entity legally authorized to engage in construction in Escambia County;

B. He/She produces evidence of ownership, operation, control and management of the firm on a daily basis;

C. He/She is an M/SBE Subcontractor as defined under paragraph 2A. 1.1.3 or 2A.1.1.4 above on the last date of Advertisement for Bids for this Project;

D. He/She can meet all requirements of Certification required by the School Board of Escambia County prior to the award of contract under the M/SBE Contractors Participation Program;

E. He/She has or is able to obtain any and all licenses and insurance required to do such work.

2A.1.1.9 Contracting and Procurement Coordinator: An employee of the School Board of Escambia County, the School Board's designated administrator of the Contract.

2A.1.1.10 Project Manager: An employee of the School Board of Escambia County assigned to this project.

2A.2 UTILIZATION OF M/SBE SUBCONTRACTORS

2A.2.1 Contractor's Obligation: Ensure that Certified M/SBE Subcontractors as defined in paragraphs 2A.1.1.4 and 2A.1.1.8 have the maximum opportunity to participate in the performance of the contract and take all necessary and reasonable steps in accordance with this Provision to ensure that Certified M/SBE Subcontractors have the maximum opportunity to compete for and perform contracts.

Failure to Comply: Every reasonable effort to utilize M/SBE subcontractors must be demonstrated to the School Board of Escambia County. Failure on the part of the Contractor to comply with the requirements of this Section shall be cause for finding the Contractor non-responsive. In the event a bid is deemed non-responsive, award may then be made to the next lowest responsive Contractor, or all remaining bids may be rejected and the project re-advertised.

All determination of compliance or non-compliance of the Contractor with the requirements of this Provision, and of the appropriate consequences of non-compliance, shall be made by the School Board of Escambia County, Florida, as provided herein. All such determinations shall be final and binding.

2A.2.2 Contract Goal: (See Paragraph 2A.1.1.7) The stated Goal is to have portions of the work under the contract performed by qualified M/SBE Subcontractors for contracts with no minimum percentage of participation .

2A.2.3 M/SBE Contractors: A Contractor who is an M/SBE Certified Contractor may, subject to compliance with the applicable requirements of this Section, achieve the stated goal by performing work with his own forces.

2A.2.4 Unavailable: An M/SBE Subcontractor is unavailable to do specific work if:

A. He/She has been informed of the terms and specifications of the Contract needed to intelligently formulate a proposal to do such work or to decline an opportunity to do so.

B. He/She does not intend, or is unable to make a proposal because of lack of interest, inability to meet the reasonable and ordinary demands connected with doing such work, unwillingness to meet the specifications for such work, unwillingness to work on this project or in this geographic area or such other reason as is determined by the School of Escambia County to be sufficient.

2A.3 BIDDING REQUIREMENTS AND PROCEDURES PRIOR TO CONTRACT AWARD:

2A.3.1 Submittals:

Within five (5) Owner Business days after bid opening, the low contractor, in ascending order of bid who has been requested to remain in competition and any other Contractor requesting to remain in competition for this contract, as a condition of contract award, shall submit to the Owner the following documents (utilizing copies of Owner provided standard forms found at the end of this Section) concerning M/SBE Contractor and Subcontractor participation in the contract:

A. Letter of Intent-M/SBE Subcontractor Participation: A letter, to the Contractor from each prospective Certified M/SBE Subcontractor that has agreed to participate in the project, stating Trade Items, and dollar amounts (M/SBE Form 1).

B. Summary-M/SBE Subcontractors Participating: Wherein all Subcontractors submitting Letters of Intent are listed, together with their Contract (Trade) Items, and subcontract dollar value amounts (M/SBE Form 2). The total M/SBE subcontract dollar value amount is compared to the total Bid Price (Base Bid and Alternates) as a percentage (%).

C. Unavailability Certification-M/SBE Subcontractor Participation: If the Contractor is unable to obtain adequate M/SBE Subcontractor Participation, he/she should request execution of M/SBE Form 3 for each M/SBE Subcontractor he/she has solicited, but who cannot participate for reasons of their own. This is necessary to show good faith effort on the Contractor's part.

2A.3.2 Failure to submit the requested forms will render a bid non-responsive.

2A.3.3 Good Faith Efforts:

If the information submitted in response to the previous paragraph demonstrates a Contractor does not meet the M/SBE Subcontractor Participation, information sufficient to satisfy the School Board of Escambia County, Florida that the Contractor has made good faith efforts must be submitted. In order to award a contract to a Contractor that has failed to meet the M/SBE Subcontracting level of participation, the School Board of Escambia County, Florida must determine that the Contractor's efforts were those that a Contractor actively and aggressively seeking participation would make given all relevant circumstances. In making the required judgement, the School Board of Escambia County, Florida may consider the kinds of efforts listed below. This is not a mandatory checklist. The School Board of Escambia County, Florida does not insist the Contractor do any one or any particular combination of things on the list, nor is the list exclusive or exhaustive. Other factors or type of efforts may be relevant inappropriate cases. In determining whether or not a Contractor has made good faith efforts the School Board of Escambia County, Florida will look not only at the different kinds of efforts that a Contractor has made, but also the quantity and intensity of these efforts.

Good Faith Efforts are as follows:

A. The Contractor, in order to increase the likelihood of meeting the goal, selected portions of the work to be performed by M/SBE Subcontractors that could be separated into economically feasible units to facilitate M/SBE Subcontractor participation;

B. The Contractor provided interested M/SBE Subcontractors with adequate information about the plans, specifications and requirements of the contract;

C. The Contractor negotiated in good faith with interested M/SBE Subcontractors, not rejecting M/SBE Subcontractors as unqualified without reasons based on a thorough knowledge of their capabilities;

D. The Contractor contacted the Minority Contract Coordinator for direct referral of Certified M/SBE Subcontractors;

E. The Contractor maintained records listing name, address, type of trade, and described results of contact with each M/SBE Subcontractor with regard to each prospective contract opportunity;

F. The Contractor engaged in specific and continuing personal recruitment efforts directed at Minority contractor's organizations, Minority recruitment organization, Small Business Development Centers, and the Minority Business Development Center (MBDC).

2A.3.4 Meeting the participation goal or making good faith efforts to do so is a condition of being awarded this contract.

2A.3.5 The listing of a M/SBE Subcontractor by a Contractor shall constitute a representation by the Contractor that such entity is qualified and not unavailable, and a commitment by the Contractor that if he/she is awarded the contract he/she will enter into a subcontract in an amount as set forth in its submittal, subject to the terms of the Contract Documents.

2A.3.6 Counting M/SBE Subcontractor Participation Toward Contract Participation.

2A.3.6.1 M/SBE Subcontractor participation shall be counted toward meeting the participation as follows:

A. Once the School Board of Escambia County, Florida has determined a firm to be an eligible M/SBE Subcontractor, the total dollar value of the contract awarded to the M/SBE Subcontractor is counted toward the participation, except at limited by paragraphs B through C below.

B. The School Board of Escambia County, Florida will count toward the participation a portion of the total dollar value of a contract with a joint venture equal to the percentage of the ownership and control of the M/SBE Subcontractor partner in the joint venture.

C. The Board shall count toward M/SBE participation the entire expenditure to a M/SBE manufacturer (i.e. a supplier that produces goods from raw materials or substantially alters them before resale).

D. The Board shall count toward M/SBE participation fifteen percent (15%) of the expenditures to M/SBE suppliers that are to manufacturers provided that the M/SBE performs a commercially useful function in the supply process.

E. The School Board of Escambia County, Florida shall count toward the participation only expenditures to M/SBE Subcontractors that perform a useful function when he is responsible for execution of a distinct element of work of a contract and carrying out his responsibilities by actually performing and supervising work involved.

F. Consistent with normal industry practices, an M/SBE Subcontractor may enter into subcontracts. If such an entity subcontracts a significantly greater portion of the work of the

contract than would be expected on the basis of normal industry practices to non-M/SBE subcontractors, the entity shall be presumed not to be acceptable as an M/SBE Subcontractor.

2A.3.7 Recommendation of Award: The following requirements must be accomplished for a Recommendation of Award:

A. Pre-Conciliation Conference: If the Minority Contract Coordinator and Director of Facilities Planning questions the acceptability of the Contractors' M/SBE Subcontractor submittals, the Contractor shall, upon at least five (5) calendar days notice given by the Minority Contract Coordinator, meet with the Minority Contract Coordinator and the Director of Facilities Planning to present information and arguments pertinent to his compliance with the applicable requirements.

B. Not later than ten (10) calendar days after this initial meeting with the Contractor, the Minority Contract Coordinator and Director of Facilities Planning shall make a written recommendation to the Assistant Superintendent for Operations as to the acceptability of the M/SBE Subcontractor involved which shall include a statement of the facts and reasons upon which it is based.

1. If the Minority Contract Coordinator and Director of Facilities Planning cannot recommend award, they will have examined the submittal of the second lowest Contractor or other Contractors in ascending order of bid who has been requested to remain in competition by submitting the required M/SBE data as defined in paragraph 2A.3.1, and will present the comparison to the Assistant Superintendent for Operations for mutual recommendation to the Board for award or rejection of all bids.

2. If the recommendation is for award, and the Assistant Superintendent for Operations is in agreement, a recommendation for award will be made immediately to the School Board of Escambia County, Florida and posted as described in another section of these documents.

2A.3.8 AWARD OF CONTRACT:

Provided the Contractor has submitted completed forms and information required by this section of the Supplementary Special Conditions and his bid is otherwise responsive to the solicitation, the School Board of Escambia County may award the contract to the lowest Contractor who submits sufficient information to the School Board of Escambia County that he has met the adequate participation goal or has made good faith efforts to attain adequate participation.

2A.4 REQUIREMENTS AND PROCEDURES SUBSEQUENT TO CONTRACT AWARD:

2A.4.1 Substitution of M/SBE Subcontractors:

A. Excuse from Entering Subcontracts: If prior to execution of a subcontract required by this Section, the Contractor submits a written request and demonstrates to the satisfaction of the Director of Facilities Planning that, as a result of a change in circumstances beyond his control of which he/she was not aware and could not reasonably have been aware prior to the award of the Contract, and M/SBE Subcontractor who was to enter into such subcontract has not qualified, or that the M/SBE Subcontractor has unreasonably refused to execute the subcontract, the Contractor shall be excused from executing such contract with that subcontractor, who will be replaced with another acceptable Certified M/SBE Subcontractor, if possible (or available).

B. Termination of Subcontracts: If, after execution of a subcontract required by this Section, the Contractor submits a written request to the School Board of Escambia County, Florida through the Architect and demonstrates to the satisfaction of the Director of Facilities Planning that, as

a result of a change in circumstances beyond his control of which he was not aware prior to the date of execution of such subcontract, an M/SBE Subcontractor who entered into such subcontract has committed and failed to remedy a material breach of the subcontract, the Contractor may proceed to exercise such rights as may be available to him to terminate the subcontract.

C. **ALTERNATIVE** Subcontracts: If the Contractor is excused from preparing a subcontract or rightfully terminates a subcontract and without such subcontract the successful Contractor will not achieve the level of M/SBE Subcontractor participation upon which the contract was awarded, the Contractor shall make every reasonable effort to propose and enter into an alternative subcontract or subcontracts for the same work to be performed by other Certified M/SBE Subcontractor(s) for a contract amount totaling not more than the contract amount under the excused or terminated subcontract less all amounts previously paid thereunder.

D. Compliance with Contract Goal: The Contractor shall be deemed to be in continued compliance with the established goal for M/SBE Subcontractor Participation in accordance with the following:

1. He/She shall propose and enter each such alternative subcontract for the same work with an M/SBE Subcontractor. OR

2. He/She demonstrates to the satisfaction of the Minority Contract Coordinator and the Director of Facilities Planning that he has made every reasonable effort to contact and negotiate with M/SBE Subcontractors in an attempt to re-subcontract such work, but hat he was unable to subcontract work because M/SBE Subcontractors were unavailable, unwilling unable or not qualified to propose a price for such work equal to or less than the amount originally scheduled for such work (less all amounts previously paid therefore).

2A.5 M/SBE PAYMENT CERTIFICATION (M/SBE FORM 4)

2A.5.1 The Contractor shall complete a M/SBE Payment Certification (M/SBE Form 4) and attach it to the Application and Certificate for Payment Form (AIA G702) to the Director of Facilities Planning.

2A.5.2 The M/SBE Form 4 must be notarized by a Notary Public in good standing who has domicile within the same county as the Prime Contractor. **Failure to complete this form may result in payment being withheld**.

END OF SECTION

M/SBE FORM 1

(Subcontractor's Letterhead) (Date)

LETTER OF INTENT
M/SBE SUBCONTRACTOR PARTICIPATION

_____ (General Contractor)

As a Certified M/SBE Subcontractor, we submit our intent to enter into contract for construction of the _____ , School District of Escambia County, Pensacola, Florida.

Services and/or products to be provided shall be as follows:

_____ (Service or Product) $_____ (Contract Amount)

_____ _____

TOTAL AMOUNT $_____

_____
SIGNATURE

_____
TITLE

M/SBE FORM 2

M/SBE SUBCONTRACTORS PARTICIPATION SUMMARY

Project: _____

General Contractor: _____
Name

_____
Address

_____

SUBCONTRACTORS (Certified Name)	SERVICE OR PRODUCT	CONTRACT VALUE

Total Participation Value $_____
Total Accepted Bid Price $_____

Total Project M/SBE Participation _____ %

Prepared by: _____

Date: _____

M/SBE FORM 3

M/SBE PARTICIPATION
REQUEST/REJECTION RECORDS

Project: _____ General Contractor: _____

M/SBE NAME	PHONE NUMBER	DATE OF NOTIFICATIONS	METHOD OF NOTIFICATION (Phone, Fax, etc.)	NOTIFICATION BY (G.C. REP)	NOTIFICATION TO (Name of Sub)	M/SBE REASON FOR PARTICIPATION REJECTION

M/SBE FORM 4

M/SBE PAYMENT CERTIFICATIONS

Project:_____

General Contractor: _____
Name

_____
Address

_____

Payment Request No. _____

Date:_____

M/SBE Subcontractor: _____
Name

_____
Address

_____

Trade:_____(Service or Product)

Subcontract Sum to Date: $ _____

Current Payment Due: $_____

General Contractor:

by:_____

date:_____

Notary:

by: _____

date:_____
affix seal)

SECTION 00510 – PROJECT FORMS

SUMMARY

The following AIA Documents shall be used on this Project:

AIA A310	Bid Bond
AIA A312	Performance and Payment Bond
AIA G702	Application and Certificate for Payment
AIA G703	Continuation Sheet for G702
AIA G704	Certificate of Substantial Completion
AIA G706	Contractor's Affidavit of Payment of Debts and Claims
AIA G706A	Contractor's Affidavit of Release of Liens
AIA G707	Consent of Surety to Final Payment
AIA G707A	Consent of Surety to Reduction in or Partial Release of Retainage
AIA G709	Work Changes Proposal Request
AIA G710	Architect's Supplemental Instructions
AIA G714	Construction Change Directive

The following DOE Forms shall be used on this Project:

OEF 110B	Certificate of Occupancy
OEF 209	Certificate of Final Inspection

The attached Escambia County School District Documents shall be used on this Project:

- Change Order
- Change Order Summary Form
- Change Order Cost Breakdown
- Final Payment Approval Sheet
- Form of Guarantee
- Contract Warranty Service Request

END OF SECTION 00510

CHANGE ORDER

INSTRUCTIONS: When a Change Order to a public educational facility, construction contract is required, the digital form shall be used. The digital form will be supplied upon request of the A/E. The A/E shall submit three (3) signed and sealed copies of the Change Order along with required back-up to the School District of Escambia County. (SDEC)

TO:	School District of Escambia County		
ATTENTION:	Office of Facilities Planning 30 East Texar Drive, Room 158 Pensacola, FL 32503	**PO #**	**Enter PO #**
RE:	Change Order Number: **Enter CO #**	DATE:	**Enter Date**
SCHOOL :	**Enter School Name**		
PROJECT TITLE :	**Enter Project Title As It Appears On The PO**		

SUBMITTED BY:	CONTRACTOR:
Enter Name	**Enter Name**
Enter Street # and Name	**Enter Street # and Name**
Enter City, State, and Zip	**Enter City, State, and Zip**

CHANGES MADE: The Owner authorized the contractor to make the following changes in the contract dated **enter date**

Item # 1: _____

Item # 2: _____

Item # 3: _____

Item # 4: _____

Item # 5: _____

Item # 6: _____

Item # 7: _____

Item # 8: _____

STATUS OF THE ACCOUNT IN ACCORDANCE WITH THE CONDITIONS OF THE CONTRACT:	
Original Contract Amount	$0.00
Sum of Previous Change Orders	$0.00
Revised Contract Amount by Previous Change Orders	$0.00
Addition to Contract	$0.00
Deduction to Contract	$0.00
Net Change to Contract Amount	**$0.00**
Revised Contract Amount by This Change Order	**$0.00**
Original Substantial Completion Date	**1/1/2007**
Revised Substantial Completion Date by Previous Change Orders	**1/1/2007**
Calendar Days Added by This Change Order	**0**
Revised Substantial Completion Date by This Change Order	**1/1/2007**

CERTIFICATION:

In my professional opinion as project architect/engineer, the prices quoted in this change order are both fair and reasonable and in the proper ratio to the cost of the original work contracted under the benefit of competitive bidding.

ARCHITECT/ENGINEER SIGN, SEAL & DATE

PM INITIAL/DATE _____

ACCEPTED

_____ DATE: _____

CONTRACTOR'S SIGNATURE OF ACCEPTANCE

APPROVED

_____ DATE: _____

SUPERINTENDENT FOR THE BOARD

co 2007.r2.828

SAMPLE FORM - USE DIGITAL FORM

THE SCHOOL DISTRICT OF ESCAMBIA COUNTY

CHANGE ORDER SUMMARY FORM

SCHOOL/PROJECT: Enter School Name, Enter Project Title As It Appears On The PO	**CHANGE ORDER # Enter CO #**

CONTRACTOR: Enter Name DATE: Enter Date

GRAND TOTAL

ITEM #1	$0.00
ITEM #2	$0.00
ITEM #3	$0.00
ITEM #4	$0.00
ITEM #5	$0.00
ITEM #6	$0.00
ITEM #7	$0.00
ITEM #8	$0.00
Addition to contract	$0.00

ITEM #1	$0.00
ITEM #2	$0.00
ITEM #3	$0.00
ITEM #4	$0.00
ITEM #5	$0.00
ITEM #6	$0.00
ITEM #7	$0.00
ITEM #8	$0.00
Deduction to contract	$0.00

Days added to Contract Time for items listed above	0

Days added to Contract Time for reasons other than items listed above	0
Reason:	

NET CHANGE TO CONTRACT	**$0.00**

GRAND TOTAL DAYS	**0**

SAMPLE FORM - USE DIGITAL FORM

THE SCHOOL DISTRICT OF ESCAMBIA COUNTY

CHANGE ORDER SUMMARY FORM

SCHOOL/PROJECT: Enter School Name, Enter Project Title As It Appears On The PO **CHANGE ORDER # Enter CO #**

CONTRACTOR: Enter Name DATE: Enter Date

ITEM #1

1 Description: 0
0

2 Requested by: _____

3 Reason for change: _____

4 Time extension: _____ Days

5 Cost Breakdown:

Subcontractor		Cost
Subcontractor's Labor (includes labor burden)		$0.00
Subcontractor's Material (includes taxes)		$0.00
Subcontractor's Equipment Rental		$0.00
Subcontractor's Total Cost (if applicable)		$0.00
Subcontractor's Overhead and Profit - 10%		$0.00
Total Subcontractor's Cost		$0.00

General Contractor		
General Contractor's Labor (includes labor burden)		$0.00
General Contractor's Material (includes taxes)		$0.00
General Contractor's Equipment Rental		$0.00
*General Contractor's Overhead and Profit on sub. work	5%	$0.00
*General Contractor's Overhead and Profit on GC work	15%	$0.00
Total General Contractor's Cost		$0.00

Bond Allowance	
Subtotal	$0.00
Bond Allowance, 1%	$0.00

Total Cost Change for This Item	$0.00

Comply with the "General Conditions of Contract for Construction". General Contractor is entitled to 15% O&P for self preformed work. Use additional sheets as needed. See Project Manual.

SAMPLE FORM - USE DIGITAL FORM

FINAL PAYMENT
APPROVAL SHEET
(*TO BE SUBMITTED WITH CONTRACTOR'S FINAL PAYMENT REQUEST)*

DATE:_____

NAME OF PROJECT: _____

_____

ARCHITECT/ENGINEER RECOMMENDATION: To the best of our knowledge, all Work has been completed in accordance with the Contract Documents and the Contractor is entitled to Final Payment on the Contract. _____

APPROVED BY:_____ **DATE:**_____
(ARCHITECT/ENGINEER)

PROJECT COMPLETED TO MY SATISFACTION

SIGN OFF:_____**DATE:**_____
(PRINCIPAL)

APPROVED BY: _____**DATE:** _____
(PROJECT MANAGER)

APPROVED BY:_____**DATE:**_____
(DIRECTOR)

COMMENTS:_____

_____

_____

Please be advised that in order to take the Final Payment to the School Board for approval, the following documentation must be submitted with Contractor's Final Payment:

- ❑ **AIA Document G704 Certificate of Substantial Completion**
- ❑ **Certificate of Occupancy/Completion from City/County Building Inspections Department**
- ❑ **OEF 110B Certificate of Occupancy (if applicable)**
- ❑ **OEF 209 Certificate of Final inspection (if applicable)**
- ❑ **AIA Document G706 Contractor's Affidavit of Payment of Debts and Claims**
- ❑ **AIA Document G706A Contractor's Affidavit of Release of Liens**
- ❑ **AIA Document G707 Consent of Surety to Final Payment**
- ❑ **Publication Notice to Creditors**

THE FORM OF GUARANTEE SHALL BE SUBMITTED TO THE SCHOOL BOARD ON COMPANY LETTERHEAD IN THE FORMAT PROVIDED BELOW. UNLESS OTHERWISE STATED IN THE SPECIFICATION, THE GUARANTEE SHALL BE WRITTEN FOR THE FOLLOWING PERIODS:

General Contractor……One Year
Sub-Contractor……..….One Year
Roofing Contractor……Two Years
Manufacturer's Warranties:
Roofing……..Fifteen Years
Roofing (Shingles)…….Twenty-five Years
Doors…….Life of Installation
Cabinets…….Three Years
Glass……..Five Years
Air Conditioning Compressors……..Five Years

FORM OF GUARANTEE

The School District of Escambia County
30 East Texar Drive
Pensacola, Florida 32503

RE: Project Name_____
Description _____
Address _____

Gentlemen:

We do hereby guarantee the labor performed and all material supplied by us against workmanship and defects for a period of _____ years from the date of acceptance by the School Board of Escambia County, Florida.

Work Performed _____

Material Supplied_____

Brand Name _____

Submitted to the School Board of Escambia County, Florida on this _____ day of _____ _____, 20___.

_____
(Firm Name)

By_____
Title_____

SCHOOL DISTRICT OF ESCAMBIA COUNTY
MAINTENANCE SERVICES DEPARTMENT
CONTRACT WARRANTY SERVICE REQUEST

DATE:	
REPORTED BY:	**TELEPHONE #:**
ISSUED BY:	**TELEPHONE #:**
	FAX#: 469-5548
PROJECT:	
SCHOOL:	
SCHOOL TELEPHONE #:	
TRADE: ELECTRICAL MECHANICAL(HVAC) PLUMBING ROOFING ELECTRONICS COMPUTER/DATA OTHER _____	
GENERAL CONTRACTOR:	
SUB-CONTRACTOR(S):	
SERVICE REQUEST DESCRIPTION: **REPAIR TIME_____Five (5)_____DAY(S).**	

DISTRIBUTION:	
School District Maintenance Department	**Fax#: 469-5548**
Office of Facilities Planning	**Fax#: 469-5634**
School Principal:	**Fax#:**
General Contractor:	**Fax#:**

Date Repaired:_____
Action(s) Taken:_____

_____

_____

If no action taken, explain why:_____

_____

_____

_____

SECTION 00810 – TOPOGRAPHIC SURVEY

PART 1 – TOPOGRAPHIC SURVEY

1.1 GENERAL

A. A topographic survey is available for review at the office of the Architect. The survey is Owner furnished and is not a part of the Contract Documents. The Owner does not guarantee the accuracy or completeness of the topographic survey.

B. Contractor shall base his bid on the information provided by the Owner with the assurance that if the Contractor encounters conditions which are materially different than those reasonably indicated, the Contractor may seek an adjustment to the Contract to cover the increased costs to perform the Work.

C. Contractor shall promptly, and before the conditions are disturbed, give written Notice to the Owner and Architect of any:

1. Physical conditions at the site which differ materially from those indicated.
2. Physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the Contract Documents.

END OF SECTION 00810

SECTION 00910 – REPORT OF GEOTECHNICAL INVESTIGATION

PART 1 – REPORT OF GEOTECHNICAL INVESTIGATION

1.1 GENERAL

A. A report of geotechnical investigation is available and attached herein. The geotechnical report is Owner furnished for reference only and is not a part of the Contract Documents. The Owner does not guarantee the accuracy or completeness of the geotechnical report nor the continuity of subsurface conditions indicated at boring locations.

B. Contractor shall base his bid on the information provided by the Owner with the assurance that if the Contractor encounters conditions which are materially different than those reasonably indicated, the Contractor may seek an adjustment to the Contract to cover the increased costs to perform the Work.

C. Contractor shall promptly, and before the conditions are disturbed, give written Notice to the Owner and Architect of any:

1. Subsurface or latent physical conditions at the site which differ materially from those indicated.
2. Unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the Contract Documents.

END OF SECTION 00910

TIERRA

REPORT OF GEOTECHNICAL EXPLORATION

Escambia Westgate Multi-use Facility
Escambia County, Florida

Tierra Project No. 4511-17-026

Prepared for:

George Koper Associates, PA
3001 North 12th Avenue
Pensacola, Florida 32503
Attn: Mr. George Koper, AIA

Prepared by:

Tierra, Inc.
1300 West Main Street
Pensacola, Florida 32502

May 11, 2018

1300 West Main Street • Pensacola, FL 32502
Phone (850) 462-8774 • Fax (850) 607-6953
Florida Certificate No. 6486

TIERRA

May 11, 2018

George Koper Associates, PA
3001 North 12th Avenue
Pensacola, Florida 32503
Attn: Mr. George Koper, AIA

Subject: Escambia Westgate Multi-use Facility
Escambia County, Florida
Tierra Project No. 4511-17-026

Mr. Koper:

Thank you for choosing Tierra, Inc. (Tierra) as your Geotechnical consultant. Per your authorization, and in general accordance with Proposal No. 45-17-003, we have completed the Geotechnical exploration for the subject project. The results of the study are discussed in this report.

Should you have any questions regarding the enclosed report or the project in general, please do not hesitate to contact us at (850) 462-8774. Tierra would be pleased to provide Geotechnical engineering and construction materials testing services throughout the design and construction phases of the project.

Sincerely,
TIERRA, INC.

TIMOTHY J. GEROW LICENSE No. 74691 STATE OF FLORIDA PROFESSIONAL ENGINEER 5/11/18

Timothy J. Gerow, PE
Sr. Project Engineer
Florida License No. 74691

Mitchell L. Smith, PE
Principal Geotechnical Engineer
Florida License No. 43416

TIERRA
GEOTECHNICAL • MATERIALS
ENVIRONMENTAL • ENGINEERING

1300 West Main Street • Pensacola, FL 32502
Phone (850) 462-8774 • Fax (850) 607-6953
Florida Certificate No. 6486

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APPENDIX A

Sheet 1 – Boring Location Plan & Soil Profiles

1.0 PROJECT INFORMATION

1.1 Project Authorization

Authorization to proceed on this project was issued by Mr. George Koper with George Koper Associates, PA via acceptance of our Geotechnical Engineering Services Proposal No. 45-17-003 dated January 16, 2017. A formal contract has been executed between Tierra, Inc. (Tierra) and George Koper Associates, PA for these services.

1.2 Project Description

Based on the information provided, we understand that the project will include a new multi-use building. The building will be an 8,600 sf single-story pre-engineered steel framed structure, and will house a half-size basketball court which will result in a maximum clear height of approximately 22 ft.

Structural details were not available at the time of this report. Preliminary column loads estimated by the project Structural engineer are 75 kips maximum. Based on existing grades, finished grades in the building area are expected to be within 2 feet of existing grade.

If any of the project information noted above is incorrect or has changed, please inform Tierra so that we may amend the recommendations presented in this report, if necessary.

1.3 Purpose and Scope of Services

The purpose of this exploration was to evaluate the subsurface conditions present in the proposed building area and to render site preparation and foundation recommendations for the proposed structure. Our exploration consisted of two 30 foot deep Standard Penetration Test borings; laboratory soil testing including water content tests and wash #200 sieve tests; and a site visit, visual classification of the soil samples, and analysis by our engineering staff.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 Site Location and Description

The site is located at the existing Escambia Westgate Center at 10050 Ashton Brosnaham Road, Pensacola, Escambia County, Florida. The general location of the site is shown on the Boring Location Plan (Appendix A).

At the time of our exploration, the site was undeveloped and grassed. The site was relatively flat.

2.2 Subsurface Conditions

Sheet 1 (Appendix A) shows the Boring Location Plan and the Soil Profiles of the two 30 foot deep Standard Penetration Test borings drilled for this study. The borings were field located using a Garmin GPSMap 64ST Global Positioning System (GPS) unit with a reported accuracy of ±1 meter. Therefore, the boring locations should be considered approximate.

The borings generally encountered very loose to loose silty and clayey sands from the ground surface to a depth of approximately 10 feet underlain by medium dense to dense clayey sand transitioning to slightly silty sand at about 20 feet which continued to the bottom of the 30 foot deep borings.

The above subsurface description is of a generalized nature, provided to highlight the major soil strata encountered. The Soil Profiles should be reviewed for specific subsurface conditions at each boring location. The stratification shown on the Soil Profiles represents the subsurface conditions at the actual boring locations only, and variations in the subsurface conditions can and may occur between boring locations and should therefore be expected. The stratification represents the approximate boundary between subsurface materials, and the transitions between strata may be gradual.

2.3 Groundwater Conditions

Groundwater was not encountered in the 30 foot deep borings at the time of drilling, which was during a period of slightly below-normal seasonal rainfall.

Note that the clayey sands encountered roughly 4 feet below existing grade are relatively slow draining, and that perched/slowly infiltrating groundwater could be present above these soils during

periods of increased rainfall. We recommend that the Contractor determine the actual groundwater levels at the time of construction to determine potential impacts groundwater can/will have on construction procedures.

2.4 Laboratory Soil Testing

Laboratory soil testing consisted of water content tests and wash #200 sieve tests. The results of these tests can be found on the Soil Profiles (Appendix A) opposite the samples tested.

3.0 EVALUATION AND RECOMMENDATIONS

3.1 General Comments

Based on our understanding of the proposed facility, the exploration indicated that the subsurface conditions encountered will provide adequate support for the proposed structure provided the recommendations presented in this report are followed. Based on the preliminary structural loads and the subsurface conditions encountered in the borings, the proposed structure can be founded on shallow foundations provided the subsoils are prepared as noted in this report. An allowable soil bearing pressure of 2,000 lbs/ft^2, which reflects the very loose nature of the surficial soils, can be used to design the footings.

Site preparation and foundation recommendations are presented in the following sections.

3.2 Site Preparation Recommendations

The proposed building area should be cleared, grubbed, and stripped of topsoil and other deleterious material. Prior to placing structural fill soils, if applicable, the top of the ground surface should be compacted to a minimum soil density of 93% of the Modified Proctor test (ASTM D1557). Non-vibratory compaction equipment should be used to reduce the potential for negative impacts on adjacent structures.

The native silty and clayey sands (Strata 2 & 3) are very moisture sensitive and will prove impractical to compact if above optimum moisture. To reduce the opportunity for potential compaction problems, we recommend that site work be scheduled for a historically dry period if practical. The site should be graded during site work operations to facilitate stormwater runoff and prevent ponding of stormwater which will soften the native clayey sands, making them unworkable. Excavations should not be left open for an extended period of time as ponded water will soften the subsoils and likely require undercutting to firm underlying soils and backfilling with compacted fill. Additionally, hydrostatic forces created by laterally flowing groundwater could de-stabilize the sides of excavations and cause sloughing.

Structural fill soils in the building area should be compacted to a minimum soil density of 95% of the Modified Proctor test (ASTM D1557).

3.3 Foundation Recommendations

Based on the expected structural loads and finished grades, the subsurface conditions encountered in the building borings are suitable for founding the proposed structure on shallow spread footings. The soil immediately beneath and to a minimum depth of 12 inches below the footings should be compacted to a minimum soil density of 98% of the Modified Proctor test (ASTM D1557).

Footings having a minimum width of 1.5 feet and a minimum embedment of 1.5 feet below finished exterior grades can be designed for an allowable soil bearing pressure of 2,000 lbs/ft^2.

Settlements on sandy soils usually occur immediately upon or soon after loading, and we would expect most of the estimated 1 inch of total settlement to occur during construction. Differential settlements should be on the order of ½ of total settlements.

3.4 Floor Slab Recommendations

A modulus of subgrade reaction of 100 lbs/in^3 can be used for floor slab design provided the slab is placed on soils similar to the near surface in-situ soils prepared in accordance with the recommendations presented in this report. To reduce the possibility of slab cracking due to minor differential settlement, we recommend that the floor slab be structurally isolated from foundations, or that transitions from foundation-supported building elements to soil supported floors be reinforced. The subgrade should be covered by an effective vapor barrier to reduce the loss of water from the plastic concrete into the subgrade soils and to reduce the possibility of slab dampness due to moisture.

4.0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by Tierra, Inc. and design details furnished by George Koper Associates, PA for the subject project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Tierra should be notified immediately to determine if changes in the foundation, or other, recommendations are required. If Tierra is not retained to perform these functions, we cannot be responsible for the impact of such conditions on the performance of the project.

The findings, recommendations, specifications, and professional advice contained herein have been made in accordance with generally accepted professional Geotechnical engineering practices in the local area.

After the plans and specifications are more complete, the Geotechnical engineer should be provided the opportunity to review the final design plans and specifications to assure our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of George Koper Associates, PA for the specific application to the subject project.

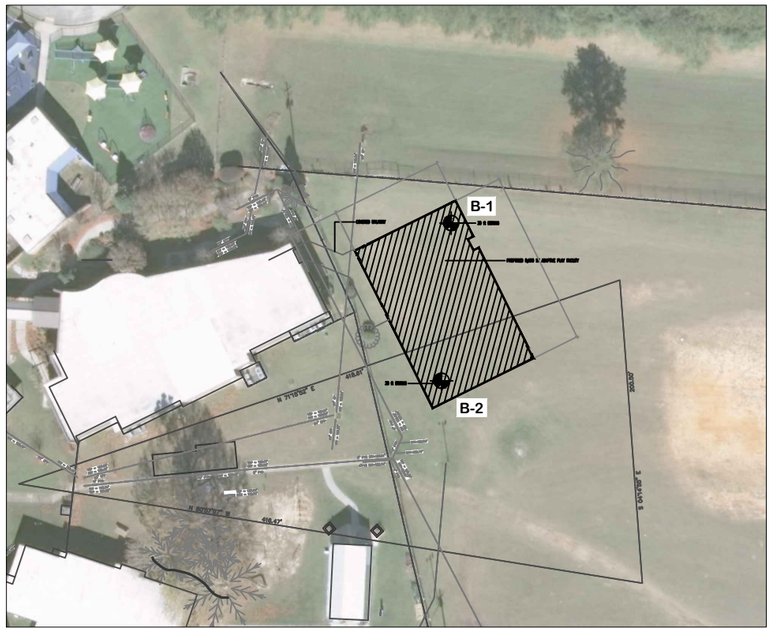
APPENDIX A

Sheet 1 – Boring Location Plan & Soil Profiles

BORING LOCATION PLAN

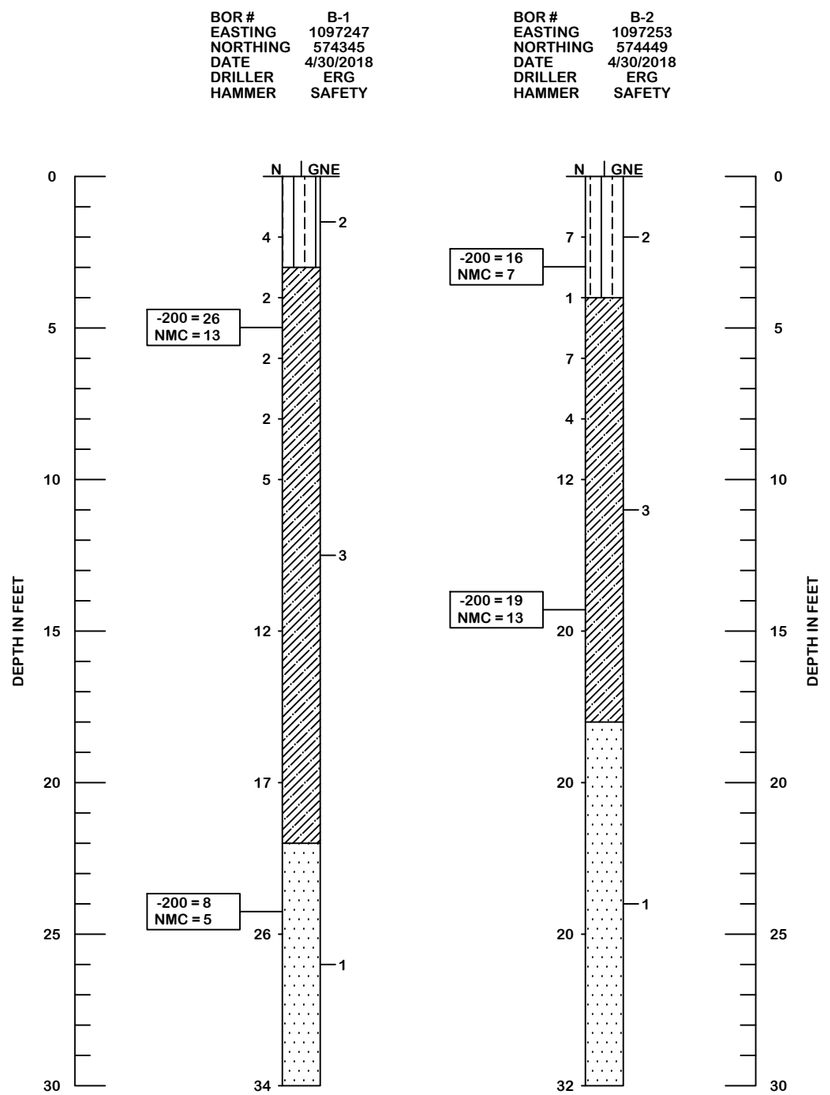
0 100'

PLAN SCALE



NOTE: BASE MAP PROVIDED BY GEORGE KOPER ASSOCIATES

SOIL PROFILES



LEGEND

1. WHITE, ORANGE, PINK SLIGHTLY SILTY SAND (SP-SM)
2. TAN, BROWN, ORANGE SILTY SAND (SM)
3. ORANGE, RED CLAYEY SAND (SC)

	APPROXIMATE LOCATION OF SPT BORING
N	SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW AND LABORATORY TESTING ON SELECTED SAMPLES FOR CONFIRMATION OF VISUAL REVIEW
GNE	GROUNDWATER TABLE NOT ENCOUNTERED
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)

SAFETY HAMMER	
GRANULAR MATERIALS-RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4
LOOSE	4 TO 10
MEDIUM	10 TO 30
DENSE	30 TO 50
VERY DENSE	GREATER THAN 50
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2
SOFT	2 TO 4
FIRM	4 TO 8
STIFF	8 TO 15
VERY STIFF	15 TO 30
HARD	GREATER THAN 30

DRAWN BY: SW
CHECKED BY: TJG
APPROVED BY: TJG
DATE: MAY 2018
ENGINEER OF RECORD: TIMOTHY J. GEROW, P.E.
FLORIDA LICENSE NO.: 74691

TIERRA
1300 West Main Street
Pensacola, Florida 32502
Phone: 850-462-8774 Fax: 850-607-6953
FL Cert. No.: 6486

SCALE: NOTED
PROJECT NUMBER: 4511-17-026

GEOTECHNICAL ENGINEERING SERVICES
ESCAMBIA WESTGATE MULTI-USE FACILITY
ESCAMBIA COUNTY, FLORIDA

SHEET 1

SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of
   1. Project Location: 10050 Ashton Brosnaham Drive, Pensacola, FL 32534.
   2. Owner: The School District of Escambia County.

B. Contract Documents, dated October 28, 2019, were prepared for the Project by George Koper Associates, PA located at 3001 N. 12th Ave., Pensacola, FL 32503.

C. Project Summary:
   1. The work consists of: new construction.
   2. Major systems include:
      a. Structural: Concrete footings and floor slab, steel structure, CMU/brick walls, steel joists, beams, elevated concrete floor with metal deck, and metal roof deck.
      b. Architectural: Steel doors and frames, wood doors, aluminum windows, steel stud/veneer plaster interior partitions, ceramic floor/wall tile, resilient flooring, plastic laminate casework, suspended acoustical panel ceilings, signage, toilet accessories, projection screens, metal roofing/soffits, insulation, and metal gutters and downspouts.
      c. HVAC: Hot and chilled water systems, variable air volume systems, ducted supply and return air systems, and ductless split heat-pump system air conditioning units.
      d. Plumbing: Wall and countertop mounted lavatories, floor mounted water closets, electric water coolers, copper water lines, cast iron sanitary sewer piping, and electric water heater.
      e. Electrical: Lighting, power, fire alarm, smoke detection, telephone, power and data distribution.
      f. Fire Sprinkler System: Wet pipe system with quick response heads.

D. The Work will be constructed under a single prime contract.

E. The Project Schedule is as follows:
   1. Anticipated Notice To Proceed date: 15 JAN 2020
   2. Substantial Completion date: 15 JAN 2021
   3. Final Completion date: 1 MAR 2021

1.02 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises is limited by the Owner's right to perform work or to retain other contractors on portions of the Project. The contractor shall coordinate his work activities as to not disrupt school operations during school hours and/or extracurricular events.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
   1. Existing Site Conditions: School will be in progress during certain periods of the construction period. Contractor shall erect and maintain construction fences and temporary barriers as required and at the direction of the School District to provide continuous protection of public life safety.
   2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

D. Connection to existing mechanical and electrical services: Contractor will be required to connect to existing mechanical and electrical services during the construction of the new work. Contractor shall inform the Owner of necessary shut-down of existing services in existing buildings and shall schedule in advance the same with the Owner. Disruption of services to existing buildings shall be kept to minimum time and may be required to be performed during periods of inactivity by the Owner in existing buildings.

1.03 OWNER FURNISHED PRODUCTS

A. The Owner will furnish and the Contractor will install the following products:
   1. Toilet Accessories – refer to Section 10800

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01010

SECTION 01035 – MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing contract modifications. Retain subparagraph below if the Project is constructed under multiple prime contracts.

1.02 MINOR CHANGES IN THE WORK

A. The Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions.

1.03 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal requests issued by the Architect are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.
   2. Within 14 days of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review.
      a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
      d. Include separate line items for labor, materials, equipment, overhead and profit, and bond costs for each item of work proposed by the General Contractor. Items involving work by Subcontractors shall include the same cost break-down with the exception of bond costs. This information is required as a minimum for review and approval of cost changes to the contract.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
   1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
   2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Comply with requirements in Section "Product Substitutions" if the proposed change requires substitution of one product or system for a product or system specified.
5. Submit proposed changes and request within 21 days of identifying item.

C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

1.04 ALLOWANCES

A. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place. Where applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
1. Include installation costs in the purchase amount only where indicated as part of the allowance.
2. When requested, prepare explanations and documentation to substantiate the margins claimed.
3. Submit substantiation of a change in scope of work claimed in the Change Orders related to unit-cost allowances.
4. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or the Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. The Owner will reject claims submitted later than 21 days.
1. Do not include the Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of the same scope and nature as originally indicated.

1.05 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and the Contractor disagree on the terms of a Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.06 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order using the School District standard Change Order Form for signatures of the Owner and the Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01035

SECTION 01045 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

A. Provide cutting and patching work, complying with project requirements for:
   1. Structural work.
   2. Mechanical/electrical systems.
   3. Visual requirements, including special detailing.
   4. Operational and safety limitations.
   5. Fire resistance ratings.
   6. Inspection, preparation, and performance.
   7. Cleaning.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Match existing materials for cutting and patching work with new materials conforming to project requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Inspect conditions prior to work to identify scope and type of work required. Notify Owner of work requiring interruption to building services or Owner's operations. Conform to project requirements listed above.
B. Perform work with workmen skilled in the trades involved. Prepare sample area of each type of work involved for approval.
C. Clean work area and areas affected by cutting and patching operations.
D. All cutting of exposed edges shall be by saw cutting.
E. Patch exposed surfaces as required to match the existing construction unless noted otherwise. Where cutting area will be concealed by new construction, make all surface preparations as required to receive the new finish material.
F. Adequately shore and support existing structural members and adjacent as required prior to the demolition of bearing construction.
G. Maintain all life safety systems in full operating condition during school hours. Provide minimum forty-eight (48) hour notification prior to any work involving life safety systems.
H. All penetrations through fire-rated construction shall be fire stopped as per NEC 300-21 using a through penetration fire stop system (XHEZ) listed in the Underwriters Laboratory Fire Resistance Directory.

END OF SECTION 01045

SECTION 01068 – DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 DEFINITIONS:

A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other contract documents, including drawings. Certain terms used in contract documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to extent not stated more explicitly in another provision of contract documents.

B. General Requirements: The provisions or requirements of Division-1 sections. General Requirements apply to entire work of Contract and, where so indicated, to other elements which are included in project.

C. Indicated: The term "Indicated" is a cross- reference to graphics, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross- reference, and no limitation of location is intended except as specifically noted.

D. Directed, Requested, etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean "directed by Architect/Engineer", "requested by Architect/ Engineer", etc. However, no such implied meaning will be interpreted to extend Architect's/ Engineer's responsibility into Contractor's area of construction supervision.

E. Approve: Where used in conjunction with Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be held to limitations of Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of contract documents.

F. Project Site: The space available to Contractor for performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on drawings.

G. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

H. Install: Except as otherwise defined in greater detail, term "install" is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

I. Provide: Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use as applicable in each instance.

J. Installer: The entity (person or firm) engaged by Contractor or its subcontractor or sub-subcontractor for performance of a particular unit of work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

K. Testing Laboratory: An independent entity engaged to perform specific inspections or tests or work, both at project site or elsewhere; and, to report and (if required) interpret results of those inspections or tests.

1.02 FORMAT AND SPECIFICATION EXPLANATIONS:

A. Specification Production: None of these explanations will be interpreted to modify substance of requirements. Portions of these specifications have been produced by Architect's/ Engineer's standard methods of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a normal result of this production technique, and no other meaning will be implied or permitted.

B. Specification Content: Because of methods by which this project specification has been produced, certain general characteristics of content, and conventions in use of language are explained as follows:

1. Specifying Methods: The techniques of specifying to record requirements varies throughout text, and may include "prescriptive", "open generic-descriptive", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

2. Overlapping and Conflicting Requirements: Where compliance with 2 or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless specifically detailed language written into contract documents (not by way of reference to an industry standard) clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal- but-different requirements, and uncertainties as to which level of quality is the more stringent, to Architect/Engineer for a decision before proceeding.

   a. Contractor's Options: Except for overlapping or conflicting requirements, where more than one set of requirements are specified for a particular unit of work, option is intended to be Contractor's regardless of whether specifically indicated as such.

3. Minimum Quality/Quantity: In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.

4. Abbreviations: The language of specifications and other contract documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual work abbreviations of a self- explanatory nature have been included in texts. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirements with notations on drawings and in schedules. These are frequently defined in section at first instance of use. Trade association names and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the contract documents so indicates.

1.03 INDUSTRY STANDARDS:

A. General Applicability of Standards: Applicable standards of construction industry have same force and effect (and are made a part of contract documents by reference) as if copied directly into the contract documents, or as if published copies were bound herewith.
   1. Referenced standards (referenced directly in contract documents or by governing regulations) have precedence over non- referenced standards which are recognized in industry for applicability to work.
   2. Non-referenced standards are hereby defined to have no particular applicability to the work, except as a general measurement of whether work complies with standards recognized in construction industry.
   3. Non-referenced standards recognized in the construction industry are hereby defined, except as otherwise limited in contract documents, to have direct applicability to the work, and will be so enforced for performance of the work.

B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

C. The following standards were utilized in the design of this project:
   1. Florida Building Code 6th Edition (2017)
   2. Florida Fire Prevention Code 6th Edition (2017)
   3. National Electric Code – NFPA 70 (2014)
   4. Life Safety Code - NFPA 101 (2015)
   5. State Requirements for Educational Facilities (2014)

D. GOVERNING REGULATIONS/AUTHORITIES: General: The procedure followed by Architect/Engineer has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing contract documents; recognizing that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contact governing authorities directly for necessary information and decisions having a bearing on performance of work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01068

SECTION 01100 – PROCEDURES, CONTROLS, AND PAYMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide coordination of work.
   1. Supervisory personnel.
   2. Pre-construction conference.
   3. Bi-weekly progress meetings: The Architect/Engineer shall prepare and distribute meeting minutes. Progress meetings shall include the Architect/Engineer, General Contractor and major subcontractors, Owners Project Manager, and school Principal. Meetings are to be held on the project site and an adequate facility provided by the contractor.
   4. Other meetings as required.

B. Construction Schedule; Submit comprehensive, fully-developed, horizontal Gantt-chart-type construction schedule within ten (10) consecutive days of notice of award of contract. Indicate each significant construction activity separately. Provide updated schedule at each weekly progress meeting.

C. Prepare submittal schedule; coordinate with progress schedule.

D. Unit Schedule; Submit schedule of values within ten (10) consecutive days of notice of award of contract, use AIA Form G-703.

E. Submit schedule of required tests (payment and responsibility).

F. Submit record drawings and specifications; to be maintained and annotated by Contractor as work progresses.

G. Submit payment request procedures use AIA Form G702, payment to be made monthly, submit to Architect for approval before 25th of each month.

H. Perform cutting and patching.

I. Clean and protect the work.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01100

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
B. Types of allowances include the following:
   1. Lump-sum allowances.

1.02 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
C. Purchase products and systems selected by Architect from the designated supplier.

1.03 SUBMITTALS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.02 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.
B. The Contractor’s responsibilities shall be the same as if the Contractor negotiated the work and all work shall be fully coordinated with appropriate subcontractors.

3.03 SCHEDULE OF ALLOWANCES

A. **Allowance No. 1: Direct Digital Control System:** Include Direct Digital Control System as specified in Section 15200 - INSTRUMENTS & CONTROLS and as shown on Drawings. Direct Digital Control System shall be provided by System Specialists, Inc. (SSI) as approved sole source. Lump sum allowance to be included in the contractor's base bid: Scope of work includes controls for AHU-G1 and G2, controls for terminal units, motorized OA and RA dampers for AHUs, motorized OA and exhaust dampers for ERV, motorized relief damper for gym, VFDs for AHU-G1 and G2, enable and monitor status of fans on ERV. All wiring will be run in conduit. Tridium Jace N4 with N/O modules to provide network interface and control of AHUs/ERV as well as programming, engineering, submittals, and graphic screens. Allowance to be included in the contractor's base bid: **$57,497**. See attached.

B. **Allowance No. 2: Fire Alarm System:** Include Fire Alarm System work as specified in Section 16721- MULTIPLEXED INTELLIGENT FIRE ALARM SYSTEM by ***Notifier*** and as shown on the Drawings to be performed by ***Securadyne***. The scope of work shall include programming, testing and certification/re-certification of the fire alarm system. Lump sum allowance to be included in the contractor's base bid: **$30,127.40**. See attached.

C. **Allowance No. 3: IP Security Integrator:** Include an IP Security Camera System Integrator by ***Glaze Communications Services, Inc.*** See attached quote for scope of work. Lump sum allowance to be included in the contractor's base bid: **$37,326.76**. See attached.

D. **Allowance No. 4: Flat Panel TV:** Include a lump sum allowance: **$6,000** for (3) three Flat Panel TVs including wall mounts and labor for installation in the contractor's base bid. Owner to approve flat panel TV prior to purchase.

E. **Allowance No. 5: Brick:** Include a **$600 per 1000** brick allowance for brick veneer in the contractor's base bid.

F. **Allowance No. 6: Vinyl Graphics:** Provide a lump sum allowance of **$5000** in the contractor's base bid to have made and installed on interior walls in locations determined by the owner (2) two school mascot logos made from self-adhering vinyl graphics over max-metal panel, approximately 15'X10'. School shall provide digital file of artwork to contractor.

G. **Allowance No. 7: Building Permit Fee:** The amount that the county will charge for a building permit, not including other permits that may be required for the project. Lump sum allowance to be included in the contractor's base bid: **$1,578.83**.

END OF SECTION 01210

SYSTEMS SPECIALISTS INCORPORATED

114 EAST WRIGHT, PENSACOLA, FLORIDA 32501

PHONE 850-432-0479 FAX 850-434-3242

September 14, 2019

Watford Engineering

Attention: Keith Johnson

Our price for furnishing and installing the Direct Digital Control System for **Adaptive Play Facility for Escambia Westgate School** is **$ 57,497.00.**

Our quote number- i1619b1

Our price includes;

- Controls for AHU's 1 & 2.
- Controls for VAV terminal units (6 total).
- Motorized OSA & RA dampers for AHU's.
- Motorized OSA & Exhaust dampers for ERV.
- Motorized Relief damper in Gym.
- Variable frequency drives for AHU's 1 & 2.
- Enable & Monitor status of fans on ERV.
- All wiring in conduit.
- Tridium Jace N4 with I/O modules to provide network interface and control of AHU's/ERV.
- Programming, engineering, submittals and graphic screens.

Our price does not include;

- Motor starters.
- Motorized dampers other than listed above.
- VAV terminal boxes. Please provide box with control enclosure, transformer & flow sensing probe.

_____

Bill Wade

Allied Universal®
Technology Services
1502 North Ninth Avenue
Pensacola, FL 32503-
Phone: 850-434-2050
Fax: (850)-469-9249
www.aus.com

Project: **Date: September 16, 2019**

Escambia County School District
Escambia Westgate School – Adaptive Play Facility
10050 Ashton Brosnaham Drive
Pensacola, FL 32535

FIRE ALARM SYSTEM ALLOWANCE:

Scope of Work:
This proposal includes a new Notifier networked intelligent addressable fire alarm voice evacuation system in the new play area and modification of the network control annunciator in the office to add fiber networked digital voice control. This work is to be performed in accordance with electrical drawings E0.1, E3.1, E3.2, & specification Section 16721

Notifier Fire Alarm Voice Evacuation System
Adaptive Play Facility
1 Notifier NFS-320 intelligent addressable fire alarm control panel with network control module, digital audio amplifier with fiber optic interface, battery cabinet, batteries, & 120V AC surge suppression
1 Remote LCD Annunciator / Remote Microphone
6 Addressable manual stations / stopper cover with horn
3 Intelligent addressable smoke detectors/base
4 Intelligent addressable duct smoke detector / sample tube
2 Addressable relays
1 Addressable dual monitor module for sprinkler waterflow & valve tamper switch
1 Addressable monitor module for BFP valve tamper switches
1 24V zone surge suppressor
18 Wall mount speaker strobes
5 Wire guard for speakers in Multipurpose Room 801
4 Wall mount strobes
3 Outdoor wall mount speakers, weatherproof
Office
Control cabinet, digital voice command, microphone, digital audio interface module – fiber, network control module – fiber, and relocate NCA-2 network control annunciator.

This proposal includes:
Equipment and Misc. Items:
Fire alarm equipment listed.
Esc. Co. fire alarm permit
Freight warranty, and misc. Items.

Allied Universal Technology Services Labor:
CAD shop drawings, power calculations, submittal data and close-out documentation.
Technician to terminate fire alarm field devices
Technician to connect and program fire alarm control panels.
Test and certification of the fire alarm system, NFPA documentation, and final acceptance testing with AHJ.
Project management

Electrical Contractor to provide:
Install FA control cabinets
Provide and install all conduits, back boxes, and cable.
Provide and install all fiber optic cable, terminations, and fiber patch panels.
Provide 120V AC power for FA panel.

EQUIPMENT & MISC ITEMS	$17,540.00
LABOR	$11,460.00
PURCHASE PRICE, EXCLUIDNG TAX	$29.000.00
ESTIMATED APPLICABLE SALES TAX	$ 1,127.40
ESTIMATED PURCHASE PRICE INCLUDING TAX	**$30,127.40**

Larry Cook, SET
Life Safety Account Executive

1864 Cowen Rd.
Gulf Breeze, FL 32563

Estimate

DATE	ESTIMATE NO.
10/15/2019	11271

NAME / ADDRESS
Allowances Security Camera Integration

Ship To
Westgate School Adaptive Play Area

REP	PROJECT
DT	Westgate AP Camera IPSC Allowance

ITEM	DESCRIPTION	QTY	COST	TOTAL
	IP Security Camera System Integrator allowance for Westgate Adaptive Play project. In accordance with drawings dated Sept-12-2019. Scope of Work (Inclusions) 1. March Networks NVR 2. Supply all cameras. 3. Review all camera locations and mounting onsite. 4. Install & program cameras in VMS. 5. Provide testing with test results. 6. Provide 3-year warranty on all product supplied by GCS. Notes (Exclusions) 1. Cabling contractor to provide all CAT6 cabling and patching. 2. Conduits provided by others. 3. PC's and monitors for clients provided by others. 4. POE switches provided by others.			
ECS 34533-106	9264 - All IP NVR supporting up to 64 camera channels. 400Mb/s recording rate, 6x8TB (48TB) of internal storage.	1	14,960.00	14,960.00
34458-101	Evolution 05 Mini Indoor Camera White	2	512.50	1,025.00
WV-X8570N	4K I-Pro Extreme Multi-SensorX	1	3,008.46	3,008.46
PWM781	Wall Mount and Shroud for WV-SFV781L	1	142.10	142.10

TOTAL

Thanks to your support GCS is now celebrating 20 years of service!

Phone #	Fax #	E-mail	Web Site
850-916-7455	850-932-9646	info@gcsgulfcoast.com	www.GCSgulfcoast.com

1864 Cowen Rd.
Gulf Breeze, FL 32563

GLAZE COMMUNICATIONS SERVICES, INC.

Structured Cabling Systems
Security Systems

Estimate

DATE	ESTIMATE NO.
10/15/2019	11271

NAME / ADDRESS	Ship To
Allowances Security Camera Integration	Westgate School Adaptive Play Area

REP	PROJECT
DT	Westgate AP Camera IPSC Allowance

ITEM	DESCRIPTION	QTY	COST	TOTAL
WV-S2550L	5 MP Outdoor Vandal Resistant Dome Network Camera	7	973.58857	6,815.12
PWM485S	OUTDOOR WALL MOUNT BRACKET FORWV-CW Gray	5	95.816	479.08
ECS 35835-101	SE2 Indoor IRA Dome - 2.8-8mm Motorized Lens, Dynamic IR, WDR, 3-Axis Gimbal, POE, LBR H.264, Alarm I/O, Audio I/O	4	284.75	1,139.00
Misc Customer Ch...	Labels, tie wraps,connectors, Starboard, etc.	1	70.00	70.00
ECSDC Labor Tech	Esc Contract Tech Rate	156	58.00	9,048.00
ECSDC Labor Pro...	Esc Contract Project Mgmt Labor	8	80.00	640.00
	Sales Tax--Escmb Cnty		7.50%	0.00

TOTAL $37,326.76

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850-916-7455	850-932-9646	info@gcsgulfcoast.com	www.GCSgulfcoast.com

SECTION 01270 - UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.02 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.03 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
D. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 LIST OF UNIT PRICES

A. UNIT PRICE NO. 1 - UNSUITABLE SOILS:
   1. Description: Excavation, removal, backfilling, compaction, and grading of rock or unsuitable soils encountered on project site in accordance with Division 2 Earthwork.
   2. Unit of Measurement: Cubic Yard (CY).

END OF SECTION 01270

SECTION 01300 - SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with project format for submittals.

B. Definitions:

1. PDF: Adobe® Portable Document Format.

C. Provide types of submittals listed in individual sections. Submittals shall be provided in digital format (PDF) and may be delivered to the Architect's office (George Koper Associates, PA, c/o Ben Poffenberger, 3001 N. 12th Ave., Pensacola, FL 32503) on a CD, "thumb-drive," or email (email to ben@gkassoc.com). Submittals will be returned with the Architect's, and when appropriate the Engineer's, review stamp indicating submittal's disposition. Submittals shall be returned in digital format (PDF). If not emailed, provide the Architect with an email address to return to. If provided by email, Architect will return by REPLY to the sender's address.

1. Contractor to review, annotate and indicate approval with the Contractor's review stamp all submittal data and shop drawings prior to submitting to Architect.

D. Samples shall be provided in quantities indicated in individual sections or as requested as follow-up to a submittal review. If not indicated, provide two (2) of each item. Samples shall be delivered to the Architect's office at: George Koper Associates, PA, c/o Ben Poffenberger, 3001 N. 12th Ave., Pensacola, FL 32503. Once used for their intended purposes, samples will be available at the Architect's office for retrieval by the contractor. If samples are not claimed within 30 days of notice of their release, they shall be disposed of by the Architect.

1. Where samples are for aesthetic finish selections and verification of finish properties, provide samples indicating range of color, finish and texture to be expected.

E. Provide Inspections and Test Reports. Deliver inspections and test reports to the Architect in digital format (PDF).

F. Provide required re-submittals; follow same procedures for the original submittal.

G. Samples and shop drawings shall be prepared specifically for this project. Shop drawings shall include dimensions and details, including adjacent construction.

H. Provide warranties as specified; warranties shall not limit length of time for remedy of damages Owner may have by legal statute. Warranties shall be signed by Manufacturer and Contractor.

I. Provide products specified or approved equal. Products submitted for substitution shall be submitted with acceptable documentation, and include costs of substitution including

related work. The contractor is responsible for all coordination and any subsequent design changes by an Architect or Engineer required by any substitutions and any subsequent costs that may be incurred from said substitutions after the contractor's bid is accepted.

J. Substitutions shall be submitted no later than 15 days prior to bid opening.

K. Closeout submittals: Provide prerequisites to Substantial Completion and Final Completion as indicated in Section 1700.

1. Owner's user or operator's manuals, maintenance manuals, and similar documentation: provide three (3) hardcopies tabbed in three ring binders. Preference is to have this documentation in 8 ½" X 11" format whenever practicable. Also provide these documents in digital format (PDF) on CD's; one (1) each for each hardcopy binder(s)/package.
2. Warranties: Unless specified elsewhere, provide three (3) copies of all warranties completely executed. Warranties shall be delivered directly to the Owner. Bind neatly in three ring binders.
3. As-builts: Provide two (2) copies of the contract document plans and specs with contractor's notes of changes, deviations, field installation details and dimensions, field directed revisions, and the like in digital format (PDF) on CD or "thumb-drive."
4. Provide all other closeout documents required by other sections of this Specification in format and quantity requested.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide temporary services and utilities:
   1. Water (potable) may be available at site for contractor use. Provide meter and pay for usage.
   2. Sewer sediment. Provide portable toilets as required for workers.
   3. Provide arrangements for temporary power for the duration of the project. Provide meter and pay for usage.
   4. Telephone and fax machine in field office.

B. Provide construction facilities:
   1. Construction equipment
   2. Enclosure
   3. Heating
   4. Lighting
   5. Access

C. Provide security and protection requirements:
   1. Fire extinguishers.
   2. Site enclosure fence, barricades, warning signs, and lights. **A six (6) foot chain link fence shall be constructed around the contractors work and lay down areas to provide security and protection for the students and staff on site. Any exceptions shall be approved by the Architect and School District project Manager.**
   3. Building enclosure and lock-up.
   4. Environmental protection.
   5. Pest control.
   6. Provide temporary walls as indicated or as required to control noise, dust, dirt, and prevent access to construction area by unauthorized persons.

D. Provide personnel support facilities:
   1. Contractor's field office.
   2. Sanitary facilities.
   3. Drinking water.
   4. Cleaning and trash removal.

PART 2 – PRODUCTS (Not Applicable)

END OF SECTION 01500

SECTION 01700 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

A. Provide prerequisites to Substantial Completion.
   1. Punch list.
   2. Escambia County Department of Health bacteriological tests indicating potable water is acceptable for drinking.
   3. Fire alarm test and certification of compliance with NFPA 72.
   4. Intercom system test and function report.
   5. Demonstrate emergency lighting is functioning in accordance with applicable codes.
   6. Exit lighting functioning in accordance with applicable codes.
   7. Fire rated opening protective's labeled and functioning in accordance with NFPA.
   8. Start-up and testing of building systems.
   9. Test and balance of the HVAC system.
   10. Coordinate change over of locks with School District project manager.
   11. Initial cleaning.
   12. Certificate of Occupancy from County Building Inspections Department.
   13. OEF 110B Certificate of Occupancy.

B. Provide prerequisites to Final Completion.
   1. Completed Punch List.
   2. Completed Commissioning Issues Log. Provide one (1) copy on CD or "thumb-drive" in digital format (PDF).
   3. OEF 209 Certificate of Final Inspection.
   4. AIA Document G702 Final Application for Payment.
   5. AIA Document G704 Certificate of Substantial Completion. Provide three (3) signed originals.
   6. AIA Document G706 Contractor's Affidavit of Payment of Debts and Claims.
   7. AIA Document G706A Contractor's Affidavit of Release of Liens.
   8. AIA Document G707 Consent of Surety to Final Payment.
   9. Maintenance & Operating Manual including warranties and similar documentation. Provide three (3) printed & tabbed manuals in 3-ring binders and one (1) manual on CD in digital format (PDF).
   10. Publication Notice to Creditors.

C. Provide closeout procedures.
   1. Final cleaning and touch-up.
   2. Turnover to Owner's personnel.
   3. Instruction/training of Owner's personnel in systems operations.
   4. Specifications and as-built record drawings. Provide two (2) copies on CD or "thumb-drive" in digital format (PDF).
   5. Removal of temporary facilities.

PART 2 - PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01700

SECTION 01710 - CLEANING

PART 1 - GENERAL

1.01 CONDITIONS AND REQUIREMENTS:

A. The General Conditions, Supplementary Conditions and Division 1 - General Requirements apply.
B. The Contractor shall perform work according to this section during construction and final cleaning of all surfaces and materials.

1.02 APPLICABLE PUBLICATIONS:

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.
   1. Code of Federal Regulations (CFR).
      40 CFR 260 -268 & 761, Hazardous Waste Management.
   2. Florida Administrative Code (FAC).
      Rule 17-30, Hazardous Waste.

1.03 DESCRIPTION:

A. Maintain premises and properties free from accumulations of waste, debris, and rubbish caused by operations.
B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

1.04 SAFETY REQUIREMENTS:

A. Standards: Maintain project in accordance with safety and insurance standards.
B. Hazards Control:
   1. Store volatile wastes in covered material containers, and remove from premises daily.
   2. Prevent accumulation of wastes that create hazardous conditions.
   3. Provide adequate ventilation during use of volatile or noxious substances.
C. Contractor shall dispose of all hazardous waste in accordance with all applicable Federal and State laws including but not limited to 40 CFR 260-268, 761 and FAC Rule 17.30
   1. Do not burn or bury rubbish and waste materials on project site.
   2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   3. Do not dispose of wastes into streams or waterways.
   4. Do not dispose of hazardous waste containers in dumpsters.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION:

A. Execute cleaning to ensure that buildings, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
B. Clean site and dispose of waste materials, debris, and rubbish on a daily basis.
C. Remove waste materials, debris, and rubbish from site and legally dispose.
D. During construction, perform magnetic sweep around construction site on a daily basis for loose nails and metallic wastes.

3.02 FINAL CLEANING:

A. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
B. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
C. Maintain cleaning until project, or portion thereof, is occupied by the Owner.

END OF SECTION 01710

SECTION 01813 - SUSTAINABLILITY DESIGN REQUIREMENTS - GREEN GLOBES

PART 1 - GENERAL

1.1 SUMMARY

A. This section describes general requirements and procedures to comply with the Green Building Initiative's (GBI) Green Globes for New Construction.

B. Some Green Globes requirements depend on product selections and may not be specifically identified as Green Globes requirements. Compliance with Green Globes requirements may be used as one criterion to evaluate substitution requests and comparable product requests.

C. The Architect has selected materials and utilized integrated design processes that achieve the Owner’s objectives. Contractor is responsible to maintain and support these objectives in developing means and methods for performing work and in proposing product substitutions or changes to specified processes. Obtain approval from Architect for all changes and substitutions to materials or processes. Proposed changes must meet, or exceed, materials or processes specified.

D. NOTE: This project will not be submitted for Green Globes Certification. The Contractor shall provide all required submittals of this submission as though it is to be submitted. A Green Globes survey will be completed by the Architect at the completion of the project to summarize general compliance and preliminary score.

1.2 DEFINITIONS

A. Green Globes: Green Building Initiative's (GBI) Green Globes for New Construction, Version 1.3.

B. Definitions that are a part of Green Globes apply to this Section.

C. Recommended Exposure Limit (REL): Recommended Exposure Limit as defined by U.S. National Institute of Occupational Safety and Health (NIOSH) to define the standard for protecting worker safety and health over a working lifetime.

1.3 SUBMITTALS

A. Provide submittals to Architect; provide additional copies of typical submittals required under technical section, when sustainability certification requires copies of record submittals.

B. Sustainable Construction Documentation Submittals: Sustainable construction documentation submittals are in addition to other submittals and must be differentiated from items submitted to comply with other requirements, such as Product Data and Certificates.

1. Verify compliance with indicated certification requirements and required documentation, for each product identified or indicated for design compliance submittal within specifications.
2. Responses to questions and requests from Architect about Green Globes requirements that are the responsibility of contractor.
3. Environmental management system documents.
4. Environmental product declarations.
5. Third-party certifications based on multiple attribute standards.
6. Third-party-certified life-cycle product assessments.
7. Waste Management Plan: Submit plan within thirty (30) days of Notice to Proceed.
8. Product Data and laboratory test reports for adhesives and sealants indicating VOC content and compliance with requirements for low-emitting materials.
9. Certificates for carpet and under-carpet adhesives indicating compliance with CRI's Green Label Plus testing program.
10. Product Data and laboratory test reports for paints indicating VOC content and compliance with requirements for low-emitting materials.
11. Laboratory test reports for flooring, insulation, acoustical ceilings, and wall coverings, indicating compliance with requirements for low-emitting materials.
12. Construction Indoor-Air-Quality (IAQ) management plan including product data for filtration media and management measures for protection of ducts and on-site stored or installed absorptive materials.
13. Building Air Flush-Out: Signed statement describing flush-out procedures including date of flush-out and replacement of filtration media.

C. Qualification Data: For Green Globes Coordinator described in this specification section.

D. Closeout Submittals:
   1. Operations and Maintenance Manuals as indicated by Green Globes 3.1.3.4, in addition to requirements specified within construction documents.

1.4 PRE-INSTALLATION MEETING

A. Pre-installation Conference: Conduct conference at project site. Review Green Globes requirements and action plans for compliance with requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect about Green Globes requirements that are the responsibility of Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures. Document responses as informational submittals

B. Schedule and enforce requirement prohibiting the installation of interior walls, wood flooring, ceilings, or HVAC systems prior to confirming building envelope as weather-tight and dry interior conditions.

1.6 QUALITY ASSURANCE

A. Green Globes Coordinator: Engage an experienced coordinator to coordinate Green Globes requirements.
   1. Green Globes coordinator may also serve as waste management coordinator.

1.7 APPLICABLE PUBLICATIONS

A. Green Globes for New Construction, Technical Reference Manual.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle organic building materials capable of absorbing moisture, to prevent deterioration or damage due to moisture, temperature changes, contaminants, or corrosion.
B. Protect stored material from organic matter including leaves, soil, or insects.
C. Do not deliver or install organic materials or materials capable of absorbing moisture until concrete has cured and wet work including painting or similar operations have been completed.
D. Do not install interior wall finishes, ceilings, or HVAC systems until the building envelope is weathertight and has been permitted to dry.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide products and procedures necessary to comply with Green Globes requirements referenced in this section. Although specifications include requirements that contribute to referenced Green Globes requirements, contractor determines additional materials and procedures necessary to comply with Green Globes requirements indicated.
B. At least 25 percent of products shall have environmental product declarations that comply with Green Globes requirements.

2.2 LOW-EMITTING MATERIALS

A. Adhesives and Sealants: For field applications inside the building, adhesives and sealants shall comply with the following VOC content limits:
   1. Wood Glues: 30 g/L.
   2. Metal-to-Metal Adhesives: 30 g/L.
   3. Adhesives for Porous Materials (except Wood): 50 g/L.
   4. Plastic Foam Adhesives: 50 g/L.
   5. Carpet Adhesives: 50 g/L.

6. VCT and LVT Adhesives: 50 g/L.
7. Resilient Base Adhesives: 50 g/L.
8. Gypsum Board and Panel Adhesives: 50 g/L.
9. Rubber Floor Adhesives: 60 g/L.
10. Ceramic Tile Adhesives: 65 g/L.
11. Multipurpose Construction Adhesives: 70 g/L.
12. Single-Ply Roof Membrane Adhesive: 250 g/L.
13. Single-Ply Roof Membrane Sealants: 450 g/L.
14. PVC Welding Compounds: 510 g/L.
15. Adhesive Primer for Plastic: 550 g/L.
16. Architectural Sealants: 250 g/L.
17. Nonmembrane Roof Sealants: 300 g/L.
18. Other Sealants: 420 g/L.

B. Adhesives and Sealants: For field applications inside the building, adhesives and sealants shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor REL or 16.5 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

C. Carpet and undercarpet adhesives shall comply with CRI's Green Label Plus testing program.

D. Paints: For field applications inside the building, wall paints shall comply with the following VOC content limits:
   1. Latex Flat Paints: 50 g/L.
   2. Latex Nonflat Paints: 150 g/L.

E. Paints: For field applications inside the building, wall paints shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." The building concentration of formaldehyde shall not exceed half of the indoor REL or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

F. Flooring and Other Interior Products: Flooring, floor coverings, insulation, acoustical ceilings, and wall coverings shall contain no more than half of the chronic REL of VOCs when tested according to the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental

Chambers." The building concentration of formaldehyde shall not exceed half of the indoor REL or 33 mcg/cu. m and that of acetaldehyde shall not exceed 9 mcg/cu. m.

PART 3 - EXECUTION

3.1 DESIGN COMPLIANCE ACTION ITEMS

A. Document the Environmental Management System (EMS) by incorporating the key elements listed in Green Globes Section 3.1.2.1 Environmental Management during Construction as follows:
   1. General Contractor’s environmental policy.
   2. Regulatory compliance and training.
   3. Environmental risk assessment.
   4. Environmental risk management strategies.
   5. Environmental management roles, responsibilities and reporting structure.
   6. Site and work instructions for on-site personnel, outlining environmental procedures.
   7. Environmental inspection checklists.
   8. Records of compliance.
   9. Emergency response plan.
B. Document a Clean Diesel Practice in addition to mandatory regulatory requirements by documenting and implementing strategies as follows:
   1. Idle reduction strategies.
   2. Use of clean or alternative fuels.
   3. Engine retrofits or repower.

3.2 NONSMOKING BUILDING

A. Smoking is not permitted within the building or on the site.

3.3 ECOLOGICAL IMPACTS

A. Ensure full implementation the erosion and sedimentation control plan for project.
B. Tree Protection: Document and implement tree protection procedures compliant with Green Globes Section 3.2.2.3.2.

3.4 CLEAN DIESEL PRACTICES

A. Comply with Green Globes requirements for clean diesel practices.

3.5 INSPECTIONS

A. Inspect project site on a periodic basis and produce a report that includes date-stamped electronic photograph files demonstrating construction activity pollution prevention.

3.6 CONSTRUCTION WASTE MANAGEMENT

A. Waste Management Plan: Submit plan within thirty (30) days of Notice to Proceed.

B. Waste Reduction Calculations: As a prerequisite to Substantial Completion, submit completed waste log documenting calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Include the following information:

1. Material Category
2. Total Quantity of waste in tons.
3. Quantity of waste diverted in tons.
4. Quantity of waste salvaged in tons.
5. Quantity of waste recycled in tons.
6. Hauler name.
7. Location of diverted waste.

C. Waste Management Implementation: Provide handling, containers for diverted, salvaged and recycled items, storage, signage, transportation, and any other items as required to implement the waste management plan during the duration of the construction contract.

3.7 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT AND ASSESSMENT

A. Employ strategies of SMACNA's IAQ Guidelines for Occupied Buildings Under Construction, to control dust, odors, or irritants.

B. Replace filter media for the air-handling system at regular intervals during construction, before building flush-out or IAQ testing, and before occupancy.

C. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent

3.8 CLOSEOUT ACTIVITIES

A. Schedule walk-through with Architect and Owner to assess compliance with requirements. Contractor is responsible party for timely walk-through without delay to Final Inspection and project closeout.

B. Cooperate with Architect and Owner to provide access to work and incidental labor and facilities necessary to perform inspections.

END OF SECTION 01813

SECTION 02070 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected portions of a building or structure.
   2. Repair procedures for selective demolition operations.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.03 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.04 SUBMITTALS

A. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.

B. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services.
   3. Coordination for shutoff, capping, and continuation of utility services.

4. Locations of temporary partitions and means of egress.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

D. Pre-demolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Regulatory Requirements: Comply with governing EPA/DEP notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

1.06 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for condition of areas to be selectively demolished.
1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site will not be permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
   1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
   1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   2. Use materials whose installed performance equal or surpasses that of existing materials.

B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary

services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.

C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.03 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Pest Control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.

C. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
3. Protect existing site improvements, appurtenances, and landscaping to remain.
4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

D. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.04 POLLUTION CONTROLS

A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.

B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.05 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.
10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Existing Facilities: Comply with Owner's requirements for using and protecting stairs, walkways, loading docks, building entries and other building facilities during selective demolition operations.

C. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

F. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

G. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

H. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

I. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for roofing requirements.

J. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.06 PATCHING AND REPAIRS

A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching: Comply with Division 1 Section "Cutting and Patching."

C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.

D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

F. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 02110 - SITE CLEARING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification Sections in this project manual, apply to this Section.

1.02 SUMMARY

A. Site Clearing work includes, but is not limited to:
   1. Protection of existing trees to remain.
   2. Protection of existing improvements.
   3. Removal of trees and other vegetation.
   4. Topsoil stripping.
   5. Clearing and grubbing.
   6. Removing above-grade improvements.
   7. Removing below-grade improvements.

1.03 PROJECT CONDITIONS

A. Traffic: Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protection necessary to prevent damage to existing improvements indicated to remain in place.
   1. Protect improvements on adjoining properties and on Owner's property.
   2. Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged, and store on Owner's premises where indicated or directed.

C. Protection of Existing Trees and Vegetation - Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.

D. Water vegetation to remain within limits of the contract work as required to maintain their health during course of construction operations.

E. Provide protection for roots over 1-1/2" diameter cut during construction operations.

Coat cut faces with emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SITE CLEARING

A. General:
1. Remove trees, shrubs, grass and other vegetation, improvements, or obstructions as required to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. "Removal" includes digging out and off-site disposing of stumps and roots.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner, where such roots and branches obstruct installation of new construction.

B. Topsoil:
1. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.
2. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.
3. Remove heavy growths of grass from areas before stripping.
4. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.
5. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion.
6. Dispose of unsuitable or excess topsoil same as specified for disposal of excess material excavated in Earthwork section.

C. Clearing and Grubbing:
1. Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing.
2. Completely remove stumps, roots, and other debris protruding through ground surface.
3. Use only hand methods for grubbing inside drip line of trees indicated to be left standing.
4. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
5. Place fill material in horizontal layers not exceeding 6 inches loose depth, and thoroughly compact to a density equal to adjacent original ground.

D. Removal of Improvements:
1. Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

3.02 DISPOSAL OF WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials and debris from property site and dispose of in a legal manner.
B. Burning on Owner's Property: NO burning will be permitted on the Owner’s property.

END OF SECTION 02110

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary Conditions and other Specification Sections within this project manual, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Extent of earthwork is indicted on drawings. This work consists of grading in order to achieve finished elevations shown on the construction plans.
   2. Preparation of subgrade for slabs, walks, concrete swales and pavements is included as part of this work.
   3. All graded surfaces shall be smooth and uniform, without abrupt changes in slope or grade. Areas to be covered with paving shall be fine graded to the required elevations and slopes. Finished surfaces in all other areas may vary up to 0.1 feet from the required elevations.
   4. Excavating and backfilling of trenches for storm sewer is included in work of this section.
   5. Excavating and Backfilling for Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances is included as work of this section.

1.03 DEFINITIONS

A. Excavation consists of removal of material encountered to subgrade elevations indicated or below subgrade elevations as directed by the Engineer and subsequent disposal of materials removed.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at Contractor's expense. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.

C. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Architect/Engineer.

D. Additional Excavation: When excavation has reached required subgrade elevations,

notify Architect/Engineer, who will make an inspection of conditions. If Architect/Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Architect/Engineer.

E. Subgrade: The undisturbed earth or the compacted soil layer immediately below base, fill, or topsoil materials.

F. Structure: Buildings, foundations, slabs, tanks, curbs, end walls, mitered end sections, inlets, manholes, or other man-made stationary features occurring above or below ground surface.

1.04 SUBMITTALS

A. Test Reports: Submit the following reports directly to Architect/Engineer from the testing services, with copy to Contractor:
   1. Test reports on borrow material.
   2. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
   3. Field reports; in-place soil density tests.
      a. One optimum moisture-maximum density curve for each type of soil encountered.
      b. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction. All material and construction methods shall be in accordance with Section 120 of the Standard Specification for Roads and Bridges, State of Florida, Department of Transportation, latest edition.

B. Testing and Inspection Service: Employ, at the Contractor's expense, a geotechnical testing laboratory, acceptable to the Owner, to perform soil testing and inspection service for quality control testing during earthwork operations. Contractor shall replace materials removed for testing purposes. Should any work of materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for re-testing of same.

1.06 PROJECT CONDITIONS

A. Site Information:
   1. Data in subsurface investigation reports was used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Architect/Engineer and the Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
   2. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum

will be authorized for such additional exploration.

B. Existing Utilities:
   1. Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
   2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of Architect/Engineer and utility owner.
   3. Do not interrupt existing utilities serving any facility during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.
   4. Provide minimum of 48-hour notice to Architect/Engineer, and appropriate Utility company and receive written notice to proceed before interrupting any utility.
   5. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.
   6. Perform Excavation by hand within drip line of trees to remain. Protect root systems from damage or dry out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with moistened burlap.

C. Use of Explosives: Use of explosives is not permitted.

D. Protection of Persons and Property:
   1. Barricade open excavations occurring as part of this work and post with warning lights.
   2. Operate warning lights as recommended by authorities having jurisdiction.
   3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.01 FILL

A. Soils used as fill shall be clean sands. Non-structural fill shall contain less than 5 percent material passing the No. 200 sieve, and structural fill shall contain less than 12 percent material passing the No. 200 sieve. The sand shall have a maximum dry density of at least 100 pounds per cubic foot according to the Standard Proctor Compaction Test, (ASTM D 698). Soil materials shall be free of debris, waste, frozen materials, vegetation and other deleterious matter.

B. In order to insure proper bond and prevent slipping between the original ground and fill, the surface of the original ground shall be scarified to a depth of at least three inches. Each layer of fill material shall be compacted until the required density is achieved.

2.02 CUT

A. Where required, the site shall be excavated to the grades depicted upon the plans. Excavated material that is suitable shall be used in the fill sections of the site. Any excess material shall be hauled away from site.

PART 3 - EXECUTION

3.01 GENERAL

A. The site shall be stripped of all organic and deleterious materials in phases, so as to prevent and impede erosion and sedimentation.

3.02 COMPACTION OF SUBGRADE, CUT AND FILL:

A. Compaction requirements shall be as determined by the Modified Proctor Test (ASTM D1557 or AASHTO T-180) or Standard Proctor Test (ASTM D 698) on existing soils, with a soil at or near optimum moisture content. In unpaved areas the top 8 inches of subgrade shall be compacted to a minimum soil density of 95% of the Standard Procter Test with large traffic sized non-vibratory equipment. In paved areas the top 8 inches of subgrade shall be compacted to a minimum soil density of 96% of the Modified Proctor Test. All roots and other materials that would diminish the efficiency of the compaction operation shall be removed prior to compacting.

B. Remove and replace or scarify and air dry soil materials that are too wet to permit compaction to specified density. Only suitable materials free from excessive moisture shall be used for fill or backfill. Suitable soil materials that have been removed because they are too wet and compaction cannot occur, may be stockpiled or spread and allowed to dry. Assist in drying may be by discing, harrowing, or pulverizing until the moisture content is reduced to a satisfactory value.

3.03 STABILIZED SUBGRADE

A. Subgrade stabilization shall be done in accordance with applicable portions of these specifications.

3.04 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

3.05 STABILITY OF EXCAVATIONS

A. All excavation work shall conform to OSHA Publication "Excavations 2226," 1990 Revision, and OSHA Excavation; Final Rule 29, CFR, Part 1926, October 31, 1989. The

Contractor will provide written assurance of compliance with the law and with the laws of Florida Chapter 90-96.

B. The Contractor's method of providing protective support to prevent cave-ins shall be submitted with the Bid and conform to OSHA requirements. Slope excavations, shoring, and trench box usage in the field be based on tabulated data and designed by the Contractor.

C. Shoring and Bracing:
   1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.
   2. Provide permanent steel sheet piling or pressure treated CCA timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

D. The Contractor shall do all shoring required to perform and protect the excavation and as necessary for the safety of the employees.

3.06 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. The Contractor shall prevent the accumulation of water in the excavated areas, and shall remove by pumping or other means, any water which accumulates in the excavation. The Contractor shall prevent the accumulation of water in both structural and trench excavations and shall remove by well point system or by other means, water which accumulates in the excavation. The Contractor shall provide, install, operate and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. The Contractor shall include the cost of this equipment and work in the price he bids for the work.

C. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

D. The Contractor shall be responsible for and ensure all effluent water from the dewatering operations meets or exceeds F.D.E.P. and C.O.E. water quality standards prior to entering jurisdictional water bodies.

3.07 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

B. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

C. Dispose of excess excavated materials not acceptable for use as backfill or fill offsite in a legal manner.

3.08 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

B. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.09 EXCAVATION FOR PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.10 TRENCH EXCAVATION FOR STORM PIPES CONDUIT AND IRRIGATION PIPES

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

C. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

C. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

E. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.11 OTHER EXCAVATIONS

A. Excavation for manholes, catch basins, junction boxes and other accessories shall be sufficient to leave at least 12 inches in the clear between their outer surfaces and the embankment of timber that may be used to protect them. Backfill of earth around

manholes shall be filled with thoroughly compacted sand or gravel at the expense of the Contractor.

B. Excavations for footings and foundations shall be made to the dimensions and elevations indicated on the drawings, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottom to required lines and grades to leave solid base to receive other work.

C. Excavations for Mechanical or Electrical structures shall be made to the dimensions and elevations indicated on the drawings and a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and inspection. Do not disturb bottom of excavations intended for bearing surface.

D. Excavation for all structures shall be made to the dimensions and elevation indicated on the drawings. Where the excavation is made below the indicated elevations, the excavation shall be restored to the proper elevation with concrete fill, or the heights of the walls and footings shall be increased. Such fill or increased height of walls and footings shall be furnished by the Contractor without extra compensations, except where additional excavation is ordered to obtain proper bearing in which case the contract price will be adjusted to cover such additional work.

3.12 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.13 BACKFILL AND FILL

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below.

1. Under grassed areas, use satisfactory non-structural fill excavated or borrow material.
2. Under walks and pavements, use satisfactory structural fill excavated or borrow material, or a combination.
3. Under piping and conduit and equipment, use structural fill satisfactory excavated or borrow materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.
4. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
5. Concrete is specified in appropriate section.
6. Do not backfill trenches until tests and inspections have been made and backfilling is authorized by Architect/Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

B. Backfill excavations as promptly as work permits, but not until completion of the following:
    1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
    2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.

C. Removal of concrete formwork.
    1. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

D. Removal of trash and debris from excavation.
    1. Ensure all permanent and/or temporary horizontal bracing is in place on horizontally supported walls while removing all trash and debris from excavations.

3.14 BACKFILLING:

A. Trenches shall be backfilled with excavated materials, free from large clods or stones. Backfill shall be deposited in layers not to exceed 6-inches (6") in thickness, moistened, and compacted to density equal to or greater than 95% of the Modified Proctor Density (ASTM D1557), to a minimum depth of 12-inches over the pipe. The remainder of the backfill shall be placed in 8-inch layers compacted to 95% maximum density of the Modified Proctor Test unless the backfill is beneath paved or building areas in which case it shall be compacted to 98% of a Modified Proctor Test.

B. Selected Materials shall be used for all backfill, Trash shall not be allowed to accumulate in spaces to be backfilled, and this space shall be well cleared before backfill is placed.

C. No fill material shall be placed, spread or rolled while the ground or fill is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until the moisture content and density of the fill are as previously specified.

3.15 GRADING (Only as Applicable per Plans)

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.
   1. Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.
   2. Concrete Swales: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.
   3. Walks: Shape surface of areas under pavement to line, grade and cross-section, with finished surface not more than 1/2" above or below required subgrade elevation.
   4. Pavements: Shape surface of areas under pavement to line, grade, and cross-section with finish surface not more than ½ inch above or below required subgrade elevation.

B. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.16 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

B. A minimum of one compaction test shall be performed on each different type of material encountered which will be subject to applicable field density tests.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.
2. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.
3. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect/Engineer.
4. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Architect/Engineer.
5. Paved Areas: Perform at least one field density test of subgrade for every 300 sq. yd. of paved area at 8 inches below subgrade in cut sections. In each compacted fill layer, perform one field density test for every 300 sq. yd. of paved area. Location of tests shall be determined by the Architect/Engineer.
6. Unpaved Areas: Perform at least one field density test of subgrade for every 1000 sq. yd. of non-paved area at 8 inches below subgrade in cut sections. In each compacted fill layer, perform one field density test for every 1000 sq. yd. of non-paved area. Location of tests shall be determined by the Architect/Engineer.
7. Trench Backfill: Field tests shall be made at the minimum rate of one test per layer of backfill per 400 linear feet of trench or at least one test per layer of backfill per run of pipe.
8. If in opinion of Architect/Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained at no additional cost.

3.17 EROSION CONTROL

A. The Contractor shall be responsible for the prevention of erosion from the site, the control of turbidity generated on site and for maintaining graded surfaces, for the duration of the project. The Contractor shall take whatever steps necessary to prevent erosion and will be responsible for any damages which might occur to down-land properties as a result of increased run-off from the site during site work construction. Erosion control methods shall be in accordance with requirements of authorities having jurisdiction.

3.18 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 EXISTING UTILITY LINES

A. Attention is called to the fact that the Contractor is responsible for contacting all utility companies to obtain locations of all existing utilities or obstructions which he may encounter during construction. After location of utilities by the appropriate utility company and Owner, it is the Contractor's liability to protect all such utility lines, including service lines and appurtenances, and to replace at his own expense any which may be damaged by the Contractor's equipment or forces during construction of the project.

3.20 BARRICADES, GUARDS, AND SAFETY PROVISIONS

A. To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained by the Contractor during the progress of the construction work. Rules and regulations of the local authorities with respect to safety provisions shall be observed.

3.21 TRAFFIC CONTROLS

A. Excavations for pipe laying operation shall be conducted in a manner to cause the least interruption to traffic. When traffic must cross open trenches, the Contractor shall provide suitable bridges.

3.22 FLOW DRAIN AND SEWER MAINTENANCE

A. Adequate provision shall be made for the flow of sewers, drains, and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored by the Contractor.

3.23 PROPERTY PROTECTION

A. Trees, fences, poles, manholes, and all other property shall be protected unless their removal is authorized; and any property damaged shall be satisfactorily restored by the Contractor at the Contractor's expense.

3.24 CLEAN-UP

A. Before final inspection and acceptance, the Contractor shall clean ditches, shape shoulders and restore all disturbed areas, including street crossings, grass plots, re-grassing if necessary, to as good a condition as existed before work started. All

trenches shall be leveled, and loose material removed from pavement, gutters, and sidewalks, employing hand labor if necessary.

3.25 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including trash, and debris and dispose of campus in a legal manner.

END OF SECTION 02200

SECTION 02211 - SODDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other specifications sections within this project manual, apply to this Section.

1.02 DESCRIPTION OF WORK

A. This work consists of sodding areas cleared during construction and not paved, or as otherwise shown on the Construction Plans. All material and construction methods shall be in accordance with sections 570, 571, 573, or 575 of the Florida Department of Transportation Standard Specifications, Latest Edition.

B. Sodding: All areas noted on Construction Plans or disturbed during construction shall be sodded.

1.03 MATERIAL

A. Sod shall be Centipede. The sod shall be live, fresh, and uninjured at the time of planting and shall have a thick mat of roots with enough adhering soil to assure growth. Apply sod within 48 hours of cutting or stack and keep moist. Do not plant dormant sod or if ground is frozen. **All plastic netting shall be removed from sod prior to installation.**

B. Placement: Prepare the ground by loosening the soil and raking. Place sod on the prepared soil to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to avoid a continuous downhill seam. Tamp or roll lightly to ensure contact with subgrade. Tamp the outer edges of the sodded area to produce a smooth contour. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass. Water sod thoroughly with a fine spray immediately after planting.

C. Watering: Keep sod continuously moist to a depth below the root zone for three weeks after placement. If there is not water available to the site, the Contractor shall provide the water for the sod, and include cost of same in his bid.

D. Maintenance: Maintain sod by watering, fertilizing, weeding, mowing, trimming and other operations such as rolling, re-grading, and re-planting as required to establish a lawn free of eroded or bare areas and acceptable to the Architect/Engineer. Where inspected work and materials do not comply with requirements, replace rejected work and continue maintenance until re-inspected by Architect/Engineer and found to be acceptable. Remove rejected materials promptly from the project site. Contractor shall include costs for maintaining sod in his bid.

1.04 WARRANTY

A. Contractor shall warranty all work and material for a period of 90 days beginning from date of acceptance of substantial completion.

END OF SECTION 02211

SECTION 02221 – TRENCHING & EXCAVATION

PART 1: GENERAL

1.01 GENERAL DESCRIPTION OF WORK

A. Excavation, shoring, dewatering, pipe bedding, trench backfill, compaction, grading and cleanup of all pipeline trenching for the project.

B. All work must be done in accordance with these specifications and the safety requirements of the State and OSHA standards.

C. Drawings and general provisions of Contract, including General and Supplementary Conditions, Earthwork Specification section and other specifications sections in this project manual, apply to work of this section.

1.02 JOB CONDITIONS

A. Accept site in condition existing during Contract time frame.

B. Groundwater/surface water found during construction are conditions of the Contract and responsibility of Contractor.

PART 2: PRODUCTS

2.01 PIPE BEDDING AND BACKFILL

A. Determination of source of materials for bedding and backfill shall be responsibility of Contractor, but use of such materials shall be subject to approval of Architect/Engineer.

B. Pipe bedding shall be angular material.

2.02 SAND BACKFILL

A. (Where specified on plans). Use sand or fine aggregate with source of material subject to approval of Architect/Engineer (See Earthwork Section 02200).

2.03 CRADLING ROCK

A. Use crushed rock or stone with 70-100% passing 1" sieve and no more than 50% passing 3/4" sieve. Crushed oyster shells are acceptable.

2.04 CONTROLLED DENSITY FILL

A. Use high slump mixture of portland cement, fly ash and fine aggregate formulated, licensed and marketed as K-Krete or equal.

B. Provide mixture with minimum 28-day compressive strength of 70 psi with no

measurable shrinkage or surface settlement.

2.05 SHEETING, SHORING AND BRACING

A. Use sound timber or structural steel.

B. Use shapes and sizes as required.

PART 3: EXECUTION

3.01 GENERAL

A. Dewatering:
1. Prevent surface water from flowing into excavation.
2. Provide equipment for handling water encountered as required. Obtain approval of proposed method of dewatering.
3. No sanitary sewer shall be used for disposal of trench water.

B. Protection of Existing Utilities:
1. Notify all utilities of location and schedule of work.
2. Locations and elevations of utilities shown on plans are to be considered approximate only. The contractor shall employ the use of Ground Penetrating Radar (GPR) equipment, or approved equal, by a qualified company with qualified personnel to locate, identify and protect existing underground utilizes in the area of work. Any utilities spotted shall be drawn on the site plan provided by the Architect/Engineer and submitted as part of the "As-Built" drawings. Cost of GPR locates shall be included in the contractors base bid. Notify utility and Architect/Engineer of conflicts between existing and proposed facilities.
3. Repair, relay or replace existing utilities damaged, destroyed or disrupted during work. Unless specified otherwise, replacement will be at the Contractor's expense.

C. Sheeting, Shoring and Bracing:
1. Provide as necessary, to hold walls of excavation, prevent damage to adjacent structures, and to protect workmen and property.
2. Leave sheeting and shoring in place where removal might cause damage to work or as otherwise indicated on drawings.
3. When moveable trench shield is used below spring line of pipe, it shall be lifted prior to any forward movement to avoid pipe displacement.

D. Changes in Grade:
1. Minor adjustments to grades may be made from plan grades to suit unforeseen construction conflicts or conditions with approval from Architect/Engineer.
2. No additional compensation will be made for such minor changes.

3.02 EXCAVATION AND TRENCHING

A. General:

1. Method of excavation at Contractor's option.
2. The Contractor will use caution when excavating under tree roots and under and around structures and utilities. Excavate by hand when necessary or appropriate.
3. Stockpile and replace topsoil equal to preexisting depth for surface restoration in grassed or agricultural areas where specified or shown on plans.

B. Trench Characteristics:
1. Depth: As indicated for pipe installation to lines and grades required with proper allowance for thickness of pipe and type of bedding specified or indicated.
2. Width:
   a. Keep width of trench as narrow as possible and yet provide adequate room for backfilling and jointing.
   b. Maximum trench width of 30-inch or pipe O.D. plus 18 inches where soil conditions permit.
3. Provide bell holes for each pipe joint where pipe bears on undisturbed earth.
4. Trench bottom shall be free of large stones and other foreign material.

3.03 ORGANIC OR UNSUITABLE MATERIALS

A. Stop work and notify Architect/Engineer.

B. Perform remedial work as directed.

C. If material is judged unsuitable and removal is authorized, remove and replace with trench stabilizing material as directed by Architect/Engineer.

3.04 ROCK EXCAVATION

A. Excavate any rock to maintain minimum 6-inch clearance around pipe.

B. Dispose of rock material not suitable for backfill as directed by Architect/Engineer.

C. Use of explosives not permitted without prior written authorization from Owner and Architect/Engineer.

D. Provide Special Hazard Insurance covering liability for blasting operations.

3.05 BEDDING

A. Place after bottom of trench has been excavated to proper depth and grade.

B. Place, compact and shape bedding material to conform to barrel of pipe to insure continuous firm bedding for full length of pipe.

C. Provide bedding as described in following table unless indicated otherwise on Plans or in Special Conditions.

Pipe Material		Minimum Bedding Class
1.	Ductile Iron Pipe	Class D*
2.	Flexible or Composite Pipe	Class 1**

**Refers to standard detail, "Pipe Envelope Requirements", see detail sheets.*
***Refers to standard detail, "Flexible Pipe Bedding Requirements", see detail sheets.*

3.06 TRENCH BACKFILL

A. Use excavated material backfill unless otherwise specified or directed.

B. Use suitable backfill for all trenches within 5 feet of buildings and beneath walks, parking areas, paved streets or existing exposed utilities (See Earthwork Section).

C. Initial Backfill:
1. Place after pipe has been bedded and checked for alignment, grade and internal obstructions.
2. Carry out in an orderly fashion after authorization to cover pipe has been given.
3. Allow no more than 300 feet of trench to be open at one time.
4. Do not backfill until concrete or mortar has sufficiently cured.
5. Record location of connections and appurtenances before backfilling.
6. Place by hand and hand tamp to not less than 12 inches above top of pipe, in layers not to exceed 6 inches in thickness, moistened and compacted to density equal to or greater than 95% of the Modified Proctor Density (ASTM D1557).
7. Backfill simultaneously on both sides of pipe to prevent displacement.
8. Place cushion of 4 feet above pipe envelope before using heavy compacting equipment.

D. Subsequent Backfill:
1. Place backfill into trench at an angle so that impact on installed pipe is minimized.
2. Compaction of all backfill material shall be performed in a manner that shall not crack, crush, and/or cause the installed pipe to be moved from the established grade and/or alignment.
3. Area under pavement and walks or within buildings shall be mechanically compacted to the top of the subgrade in 6 to 8-inch lifts to a minimum of 98 % of the Modified Proctor Density.
4. Areas not subject to vehicular traffic shall be backfilled and compacted in layers not more 8 inches and compacted to 95% of the Modified Proctor Density.
5. Compaction method at discretion of Contractor with following exceptions:
   a. If in Architect/Engineer's opinion compaction method presents potential damage to pipe, it will not be allowed.
   b. Compaction of any backfill material by flooding or jetting will require prior written authorization of Architect/Engineer.
6. Mound excavated materials no greater than 6 inches in open areas only.
7. Fill upper portion of trench with topsoil as specified hereinbefore.
8. No trench shall be open overnight.

E. Controlled Density Fill:
1. Use where shown on plans.

2. Provide suitable forms to limit volume of controlled density fill material.
3. Protect exposed utility lines during placement.
4. Place material in accordance with suppliers' written recommendations unless directed otherwise by Architect/Engineer.

3.07 EXCESS MATERIAL

A. Dispose of waste excess excavated material as directed by Architect/Engineer.

3.08 TESTING

A. Payment of failed tests will be the responsibility of Contractor.

B. Minimum of one soil proctor for each type of material encountered:
   1. See Earthwork Section

C. In Place Density: Field tests shall be made at the minimum rate of one test per layer of backfill per 100 linear feet of trench or at least one test per layer of backfill per run of pipe.
   1. ASTM D1556 (Sand Cone)
   2. ASTM D2167 (Balloon)
   3. ASTM D3017 (Nuclear)

END OF SECTION 02221

SECTION 02280 – TERMITE CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide soil poisoning beneath the building and the area around the perimeter of the building.

1.02 SUBMITTALS

A. Submit for approval product data, guarantee, and warranty.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.04 GUARANTEE

A. Furnish the Owner with a Certified Guarantee, stating the following: Treatment shall remain effective for not less than five (5) years from the date of the Certificate of Occupancy. The contractor shall furnish a written 5-year guarantee stating that if, at any time during the 5-year period, ground nesting termites occur, treatment will be applied to exterminate all infestations without cost to Owner. The School District Maintenance representative must be present at all re-treatments under the same conditions as treatment. There shall be no annual cost, to the Owner, to keep the policy in effect for the full five (5) year period. All correspondence during the five (5) year period related to re-treatments or guarantee shall be directed to the Maintenance Department at 469-5478. Do not contact the school.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Treat with a non-repellant subterranean termiticide, registered by EPA.

B. Termiticide used shall meet the following standards:
   1. Active Ingredients: Fipronil:5-amino-1(2,6-dichloro-4(trifluoromethyl) pheny)4-(1,R,S)-(trifluoromethyl)sulfiny)-1-H-pyrazole-3-carbonitrile……..80%

PART 3 - EXECUTION

3.01 INSTALLATION

A. Soil treatment shall be strictly applied in accordance with the manufacturer's label, the recommendations of the National Pest Control Association, and the Florida Department of Agriculture & Consumer Services', Memorandum No. 685 dated October 29, 1997, as follows:

1. All aspects of the label shall be done according to the specific job site requirement.
2. Termiticides shall be mixed at the "maximum" ratio allowed as per individual label specifications.
3. All horizontal barriers shall be treated at the rate of one gallon per ten square feet.
4. All vertical barriers shall be treated at the rate of four gallons per ten linear feet (per foot of depth), not to exceed four feet of depth.
5. All void barriers shall be treated at the rate of two gallons per ten linear feet.
6. All critical areas, such as penetrations through slab, plumbing, conduit, electrical, etc. shall be treated at the rate of one gallon per square foot.
7. All foundation block shall be treated with termiticide before being filled with concrete.
8. Exterior applications shall be done before sidewalks, porches, patios, and driveways, etc. are completed.
9. All final vertical applications shall be done after final landscaping and grading is completed.
10. Applicator shall have dedicated tank. Tank that is used for applying repellant type termiticides will not be allowed.
11. The applicator shall prepare and show the District maintenance representative his calculations of application and the numbers will be verified by District maintenance representative.

B. A School District maintenance representative must be present when the soil is being treated for termites. Therefore, the School District Maintenance Department and the Office of Facilities Planning shall be notified at least 24 hours prior to the scheduled soil treatment. The General Contractor is responsible for contacting the Maintenance Department and the Office of Facilities Planning for each individual scheduled termiticide application. Maintenance can be reached at 469-5478, and Facilities Planning can be reached at 456-5660.

C. If the potential for a student's safety exists due to overspray drift, pre-treatments may need to be scheduled for after school hours, (excluding weekends).

D. Applicator shall wait until maintenance staff has arrived before mixing any chemical. If not, chemical that has been mixed will not be accepted as being at the proper ratio and shall not be used.

E. Applicator shall use termiticide from its original sealed container and container shall be opened in the presence of the District maintenance representative.

F. Container shall have original label intact.

G. Applicator shall furnish label and MSDS sheets of termiticides being used at the time of application to the District maintenance representative.

H. Applicator shall provide sample of raw chemical and tank mix upon request of District maintenance representative.

I. Applicator shall add marking die to each tank mix to insure uniform coverage.

J. The Contractor shall be responsible for ensuring that the contracted Pest Control firm is called back to perform all final applications.

K. If sidewalks, porches, patios, driveways, etc. are poured adjacent to the structure before area has been treated with termiticide, they must be removed for the area to be treated and then built back. Patched drill holes in new construction will not be accepted.

L. The treatment of the soil shall be done in accordance with Memorandum No. 685 from the Florida Department of Agriculture as follows: "The application of horizontal and vertical barriers must be done at the full label concentration and in volumes (amounts) specified on the label." This may require three separate trips or more by the soil treatment contractor.

M. Do not begin treatment work until all excavation, filling and grading is completed. Do not apply treatment to frozen or excessively wet soils.

N. Post signs and other warning indicating that soil poisoning has been applied. Protect persons and property from injury or damage from soil treatment work.

END OF SECTION 02280

SECTION 02500 - STORMWATER

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Specification Sections in this project manual, apply to work of this Section.

1.02 DESCRIPTION OF WORK

A. The work covered by this section of the specifications includes the installation of storm drainage piping and drainage structures. All labor, material, equipment, appurtenances, services, permits and other work or costs necessary to construct the facilities and place them into operation shall be furnished by the Contractor.

B. Site Information: The Contractor shall verify by whatever means necessary, the existing utility and storm sewer locations prior to beginning work. Notify Architect/Engineer immediately of any conflicts between existing conditions and proposed work.

C. Coordinate with other work in project area.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete:
   1. All materials used for concrete and the design of all concrete mixes shall conform with the recommendations of the American Concrete Institute (ACI 211.). All concrete, unless noted otherwise, shall develop a 28-day compressive strength of 3000 psi. If any concrete should fail to meet the strength requirements, the structure shall be removed as necessary to remove the defective concrete and shall then be rebuilt.
   2. All sampling and testing shall be conducted by a testing laboratory under the direction of a Professional Architect/Engineer, licensed in the State of Florida, at the Contractor's expense. Submit test results directly to the Architect/Engineer. The following tests shall be taken:
      a. 28-day compressive test of concrete, minimum of three test cylinders per 50 cubic yards of concrete poured.
      b. Air content, minimum one test for each day's pour.
      c. Slump test, minimum three tests per 50 cubic yards of concrete poured. If less than 50 cubic yards is poured, then a minimum of three tests per day.
   3. Contractor shall replace materials removed for testing purposes.
   4. Should any work or materials fail to meet the requirements set forth in the plans and specifications, Contractor shall pay for retesting of same.

B. Forms:

1. Construct all forms accurately to the dimensions and lines shown, and brace so as not to yield. All forms for contact with concrete that will be exposed to view after completion shall have a smooth, dense surface (i.e. such as tempered Masonite) without any holes or imperfections. The alignment of the forms shall be checked frequently during the placing of concrete. If any movement occurs, stop the placing of concrete until the proper alignment is restored.

C. Reinforcement:

1. Bars shall be of intermediate grade steel in accordance with ASTM Designation a 615, Grade 60. Welded wire mesh shall conform to ASTM A185 for smooth wire and ASTM A 497 for deformed wire.
2. All reinforcement shall be fabricated and placed in accordance with ACI 318. Welded wire mesh shall be lapped 6-inches at all edges.
3. The Architect/Engineer shall be notified at least 24 hours before the pouring of any concrete is to be started, and such pouring shall not be started until the reinforcement has been approved as placed.

D. Placing, Curing and Finishing: The mixing, placing, curing and finishing of concrete shall comply with ACI 304 and ACI 318. All exposed concrete shall be given a hard steel-troweled finish with no trowel marks remaining. No cement shall be dusted on the surface. All concrete shall be cured by coating with an approved curing membrane, or by keeping it wet for at least six days after pouring. After the forms are stripped, all exposed concrete surfaces shall be painted as needed and rubbed to a uniform finish.

E. Masonry:

1. Bricks for accessories shall be hard common clay brick. Mortar shall be one part Portland cement and three parts masonry sand to which shall be added lime putty in the amount of fifty percent (50%) of the volume of cement. Special commercial mortar mixes may be used if approved by the Architect/Engineer. All masonry material shall conform to the latest applicable ASTM specifications.
2. Set all masonry units in full beds of mortar, with full joints and strike all joints flush.
3. Masonry reinforcements shall be galvanized Dur-o-wal, or approved equal, and shall be installed at every other bed joint.

F. Catch Basin, Drop Inlet and Junction Box Castings: All storm sewer castings shall be heavy duty traffic units with opening sizes as indicated on the construction plans. The units shall be as manufactured by the Vulcan Foundry, Denham Springs, Louisiana; Neenah Foundry Company, Neenah, Wisconsin; McKinley Iron Works, Fort Worth, Texas; or approved equal.

G. Catch Basin, Drop Inlet, Junction Box, Box Culvert, Endwall, Wingwall, and Mitered End Section Construction: Concrete bases shall be poured in place on undisturbed dry subgrades to the dimensions shown on the plans.

H. Steps: Wide enough for a man to place both feet on one step and designed to prevent lateral slippage off the step. Steel-reinforced plastic or approved equal. Steps shall be integrally cast into structure sidewalls, unless otherwise indicated. The castings shall be set accurately to grade with catch basin grates set 1/2 inch below the finished grade.

I. Concrete Pipe: Where required in the plan, all concrete pipe shall conform to the requirements of ASTM C-76 for Class III O-ring reinforced concrete pipe with flexible watertight gaskets. Alternately, fiber reinforced concrete pipe may be used with the approval of the Architect/Engineer.

J. HDPE Pipe: Where required in the plan, all storm sewer pipe shall be High Performance, Double Wall, High Density Polyethylene (HDPE) with water tight (WT) joints or approved equal.

K. Test Reports: Certified records of the tests made by the manufacturer, or by a reliable commercial laboratory or by both, shall be submitted to the Architect/Engineer with each shipment of pipe.

L. Pipe Inspections: All pipe will be inspected upon delivery and such as does not conform to the requirements of this Contract shall be rejected and immediately removed by the Contractor. The Contractor shall furnish and provide all labor necessary to assist the Architect/Engineer in inspecting the material.

M. Basis of Rejection: The basis of rejection shall be as specified in applicable ASTM specifications as last revised.

PART 3 - EXECUTION

3.01 LAYING CONCRETE STORM PIPE

A. General:

1. Before lowering pipe into trenches, the bottom of the ditch shall be graded so that when the pipe rests in the ditch it will have a bearing for its entire length and the bottom of the trench shall be shaped to conform to "Class C" bedding, as per the American Concrete Pipe Association’s Concrete Pipe Handbook. The pipe shall be carefully examined for defects and the inside cleaned. After placing pipe in ditch, the ends shall be wiped free from all dirt, sand, and foreign material. The joints shall then be made in accordance with the recommendations of the pipe manufacturer.
2. All pipe shall be handled and installed in strict accordance with the manufacturer's printed instructions.
3. A copy of the installation manual shall be furnished to the Architect/Engineer prior to placing pipe on the job site.

B. Direction of Laying:

1. The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of flow. All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that when laid they will form a sewer with a uniform invert in a straight line.
2. Install in accordance with applicable provisions of American Concrete Pipe Association "Concrete Pipe Field Manual", unless otherwise indicated.
3. Place circular concrete pipe with elliptical reinforcing so that reference lines

indicating top of pipe are not more than 5 degrees from vertical plane through longitudinal axis of pipe.

C. Protecting Underground Surface Structures: Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his own expense under the direction of the Architect/Engineer.

D. Unsuitable Conditions: No pipe shall be laid in water, or when the trench conditions or weather is unsuitable for such work, except by permission of the Architect/Engineer.

3.02 INSTALLATION OF HDPE PIPE

A. Installation of HDPE shall be in accordance with the plan detail and all manufacturers' installation recommendations.

3.03 INSPECTION AND CLEAN-UP

A. Inspection:

1. Material and work shall be completed in strict accordance with the contract documents.
2. On completion of each section of pipe, or such other time as the Architect/Engineer may direct, the section of pipe is to be cleaned, and inspected. All repairs shown necessary by the inspections are to be made, broken or cracked pipe replaced, all deposits removed and the pipe left true to line and grade as herein specified, or shown on the plans, entirely clean and free from lumps and ready for use. Each section of the pipe between structures is to show from either end on examination, a full circle of light. Each appurtenance to the system shall be of the specified size and form, be neatly and substantially constructed, with the top set permanently to exact position and grade.

B. Clean-up: Before final inspection and acceptance, the Contractor shall clean ditches, shape shoulders and restore all disturbed areas, including street crossings, grass plots, to as good as condition as existed before work started. All trenches shall be leveled and loose material removed from pavement gutters and sidewalks, employing hand labor, if necessary.

END OF SECTION 02500

SECTION 02510 - WATER DISTRIBUTION

PART 1 GENERAL

1.01 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A 536	Ductile Iron Castings
ASTM B 61	Steam or Valve Bronze Castings
ASTM B 62	Composition Bronze or Ounce Metal Castings
ASTM C 94	Ready-Mixed Concrete
ASTM D 1785	Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2241	Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D 2466	Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2855	Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F 402	Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in. (75 mm Through 1200 mm), for Water and Other Liquids
AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C153/A21.53	Ductile-Iron Compact Fittings, 3 in. Through 24 in. (76 mm Through 610 mm) and 54 in. Through 64 in. (1,000 mm Through 1,600 mm), for Water Service
AWWA C500	Metal-Seated Gate Valves for Water Supply Service
AWWA C502	Dry-Barrel Fire Hydrants
AWWA C508	Swing-Check Valves for Waterworks Service, 2 in. (50 mm) Through 24 in. (600 mm) NPS
AWWA C509	Resilient-Seated Gate Valves for Water and Sewerage Systems
AWWA C600	Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
AWWA C800	Underground Service Line Valves and Fittings
AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
AWWA M23	PVC Pipe - Design and Installation

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	Installation of Private Fire Service Mains and Their Appurtenances

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-3	Installation of Polyvinyl Chloride (PVC) Pressure Pipe
UBPPA UNI-B-8	Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe

UNDERWRITERS LABORATORIES INC. (UL)

UL 246	Hydrants for Fire-Protection Service
UL 262	Gate Valves for Fire-Protection Service
UL 312	Check Valves for Fire-Protection Service
UL 789	Indicator Posts for Fire-Protection Service

1.02 DESIGN REQUIREMENTS

A. Water Distribution Mains: Provide water distribution mains indicated as 4 through 12-inch diameter pipe sizes of ductile-iron or polyvinyl chloride (PVC) plastic pipe. Also provide water main accessories, gate valves and check valves as specified and where indicated.

B. Water Service Lines: Provide water service lines indicated as less than 4-inch lines from water distribution main to building service at the point indicated. Water service lines shall be polyvinyl chloride (PVC) plastic pipe. Provide water service line appurtenances as specified and where indicated.

1.03 SUBMITTALS

Submit the following in accordance with Section 01330, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES:

SD-03 Product Data

Piping Materials

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Hydrants

Indicator posts

Corporation stops

Valve boxes

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

SD-07 Certificates

Water distribution main piping, fittings, joints, valves, and coupling

Water service line piping, fittings, joints, valves, and coupling

Shop-applied lining and coating

lining

Fire hydrants

Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

SD-08 Manufacturer's Instructions

Installation procedures for water piping

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves and hydrants free of dirt and debris.

B. Handling: Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry, do not drag pipe to the trench. Store plastic piping, jointing materials and rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

PART 2 - PRODUCTS

2.01 WATER DISTRIBUTION MAIN MATERIALS

A. Piping Materials

1. Polyvinyl Chloride (PVC) Plastic Piping

a. Pipe and Fittings: Pipe, AWWA C900, shall be plain end or gasket bell end, Pressure Class 150 (DR 18) with cast-iron-pipe-equivalent OD. Fittings shall be gray iron or ductile iron, AWWA C110/A21.10 or AWWA C153/A21.53, and have cement-mortar lining, AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph.

b. Joints and Jointing Material: Joints for pipe shall be push-on joints, ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints ASTM D 3139, or compression-type joints/mechanical joints, ASTM D 3139 and AWWA C111/A21.11. Provide each joint connection with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe, ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories, AWWA C111/A21.11, respectively, for push-on joints and mechanical joints. Mechanically coupled joints using a sleeve-type mechanical coupling, as specified in paragraph entitled "Sleeve-Type Mechanical Couplings," may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.

B. Valves, Hydrants, and Other Water Main Accessories

1. Gate Valves on Buried Piping: AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: (1) AWWA C500 shall be non-rising stem type with double-disc gates and mechanical-joint ends or push-on joint ends as appropriate for the adjoining pipe, (2) AWWA C509 shall be non-rising stem type with mechanical-joint ends, and (3) UL 262 shall be inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 200 psi, and shall have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined. Materials for UL 262 valves shall conform to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

2. Gate Valves: AWWA C500, AWWA C509, or UL 262. Unless otherwise specified, valves conforming to: AWWA C509 shall be non-rising stem type

with flanged ends and a working pressure of 200 psi. Stuffing boxes shall be bolted and constructed so as to permit easy removal of parts for repair.

3. Check Valves: Swing-check type, AWWA C508 or UL 312. Valves conforming to: (1) AWWA C508 shall have iron or steel body and cover and flanged ends, designed for a working pressure of 200 psi. Valves shall have clear port opening. Valves shall be spring-loaded.
4. Fire Hydrants: Dry-barrel type. Paint hydrants with at least one coat of primer and two coats of yellow enamel paint, except use red enamel paint for tops of hydrants in non-potable water systems. Stencil hydrant number and main size on the hydrant barrel using black stencil paint.
    a. Dry-Barrel Type Fire Hydrants: Dry-barrel type hydrants, AWWA C502 or UL 246, "Base Valve" design, shall have 6-inch inlet, 5 1/4-inch valve opening, one 4 1/2-inch pumper connection, and two 2 1/2-inch hose connections. Pumper connection and hose connections shall be individually valved with independent nozzle gate valves. Inlet shall have mechanical-joint end only; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nut, cap nuts, and threads on hose and pumper connections shall be as specified in AWWA C502. Hydrants indicated as "traffic type," shall have frangible sections as mentioned in AWWA C502. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and shall be designed to have the special couplings break from a force not less than that which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.
5. Indicator Posts: UL 789. Provide for gate valves where indicated.
6. Valve Boxes: Provide a valve box for each gate valve on buried piping, except where indicator post is shown. Valve boxes shall be of cast iron or precast concrete of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches. Cast-iron box shall have a heavy coat of bituminous paint.
7. Sleeve-Type Mechanical Couplings: Couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects; the design shall provide for confinement and compression of the gaskets. For ductile iron and PVC plastic pipe, the middle ring shall be of cast-iron or steel; and the follower rings shall be of malleable or ductile iron. Gaskets shall be designed for resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Bolts shall be track-head type, ASTM A 307, Grade A, with nuts, ASTM A 563, Grade A; or round-head square-neck type bolts, ANSI B18.5.2.1M and ANSI/ASME B18.5.2.2M with hex nuts, ASME/ANSI B18.2.2. Bolts shall be 5/8 inch in diameter. Bolt holes in follower rings shall be of a shape to hold fast

the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

8. Tracer Wire for Nonmetallic Piping: Provide bare copper or aluminum wire not less than 0.10 inch in diameter in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.02 WATER SERVICE LINE MATERIALS

A. Piping Materials

1. Plastic Piping: Plastic pipe and fittings shall bear the seal of the National Sanitation Foundation for potable water service. Plastic pipe and fittings shall be supplied from the same manufacturer.
    a. Polyvinyl Chloride (PVC) Plastic Piping: ASTM D 1785, Schedule 40; or ASTM D 2241, with SDR as necessary to provide 150 psi minimum pressure rating. Fittings, ASTM D 2466. Pipe and fittings shall be of the same PVC plastic material and shall be one of the following pipe/fitting combinations, as marked on the pipe and fitting, respectively: PVC 1120/PVC I; PVC 1220/PVC 12; PVC 2120/PVC II; PVC 2116/PVC II. Solvent cement for jointing, ASTM D 2564.
2. Insulating Joints: Joints between pipe of dissimilar metals shall have a rubber-gasketed or other suitable approved type of insulating joint or dielectric coupling which will effectively prevent metal-to-metal contact between adjacent sections of piping.

B. Water Service Line Appurtenances

1. Corporation Stops: Ground key type; bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be suitable for solder-joint, or flared tube compression type joint. Threaded ends for inlet and outlet of corporation stops, AWWA C800; coupling nut for connection to flared copper tubing, ASME/ANSI B16.26.
2. Curb or Service Stops: Ground key, round way, inverted key type; made of bronze, ASTM B 61 or ASTM B 62; and suitable for the working pressure of the system. Ends shall be as appropriate for connection to the service piping. Arrow shall be cast into body of the curb or service stop indicating direction of flow.
3. Gate Valves on Buried Piping (3 Inches and Larger): Gate valves 3-inch size and larger on buried piping AWWA C500 or UL 262 and of one manufacturer. Valves, AWWA C500, non-rising stem type with double-disc gates. Valves, UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Materials for UL 262 valves conforming to the reference standards specified in AWWA C500. Valves shall open by counterclockwise rotation of the valve stem. Stuffing boxes shall have 0-ring stem seals and shall be bolted and constructed so as to permit easy removal of parts for repair.
4. Gate Valves on Buried Piping (Smaller Than 3 Inches): Gate valves smaller than 3-inch size on buried Piping MSS SP-80, Class 150, solid wedge, non-rising

stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide handwheel operators.

5. Curb Boxes: Provide a curb box for each curb or service stop. Curb boxes shall be of cast iron of a size suitable for the stop on which it is to be used. Provide a round head. Cast the word "WATER" on the lid. Each box shall have a heavy coat of bituminous paint.
6. Valve Boxes: Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable. Provide a round head. Cast the word "WATER" on the lid. The least diameter of the shaft of the box shall be 5 1/4 inches.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPELINES

A. General Requirements for Installation of Pipelines: These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements..." paragraphs.

1. Location of Water Lines: Terminate the work covered by this section at a point approximately 5 feet from the building, unless otherwise indicated. Do not lay water lines in the same trench with gas lines fuel lines or electric wiring.
   a. Water Piping Installation Parallel with Sewer Piping
      (1) Normal Conditions: Lay water piping at least 10 feet horizontally from a sewer or sewer manhole whenever possible. Measure the distance edge-to-edge.
      (2) Unusual Conditions: When local conditions prevent a horizontal separation of 10 feet, the water piping may be laid closer to a sewer or sewer manhole provided that:
         (a) The bottom (invert) of the water piping shall be at least 18 inches above the top (crown) of the sewer piping.
         (b) Where this vertical separation cannot be obtained, the sewer piping shall be constructed of AWWA-approved water pipe and pressure tested in place without leakage prior to backfilling.
         (c) The sewer manhole shall be of watertight construction and tested in place.
   b. Installation of Water Piping Crossing Sewer Piping
      (1) Normal Conditions: Water piping crossing above sewer piping shall be laid to provide a separation of at least 18 inches between the bottom of the water piping and the top of the sewer piping.
      (2) Unusual Conditions: When local conditions prevent a vertical separation described above, use the following construction:
         (a) Sewer piping passing over or under water piping shall be constructed of AWWA-approved ductile iron water piping, pressure tested in place without leakage prior to backfilling.

(b) Water piping passing under sewer piping shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer piping and the top of the water piping; adequate structural support for the sewer piping to prevent excessive deflection of the joints and the settling on and breaking of the water piping; and that the length, minimum 20 feet, of the water piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer piping.

(c) Sewer Piping or Sewer Manholes: No water piping shall pass through or come in contact with any part of a sewer manhole.

2. Earthwork: Perform earthwork operations in accordance with Section 02211, "Trench Excavation, Backfill and Compaction."

3. Pipe Laying and Jointing: Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper lengths any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 2 1/2 feet.

4. Installation of Tracer Wire: Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

5. Connections to Existing Water Lines: Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped, except as otherwise specified, tap concrete pipe in accordance with AWWA M9 for tapping concrete pressure pipe.

B. Special Requirements for Installation of Water Mains

1. Installation of PVC Plastic Water Main Pipe: Installation of PVC Plastic Water Main Pipe and Associated Fittings: Unless otherwise specified, install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines"; with the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings; and with the recommendations for pipe joint assembly and appurtenance installation in AWWA M23, Chapter 7, "Installation."

   a. Jointing: Make push-on joints with the elastomeric gaskets specified for this type joint, using either elastomeric-gasket bell-end pipe or elastomeric-gasket couplings. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel; for push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UBPPA UNI-B-3 for laying the pipe and the recommendations in AWWA M23, Chapter 7, "Installation," for pipe joint assembly. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories and with the applicable requirements of AWWA C600 for joint assembly. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble in accordance with the requirements of UBPPA UNI-B-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111/A21.11. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer using internal stiffeners as previously specified for compression-type joints.

   b. Pipe Anchorage: Provide concrete thrust blocks for pipe anchorage. Thrust blocks shall be in accordance with the requirements of UBPPA UNI-B-3 for reaction or thrust blocking and plugging of dead ends, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one-part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.

2. Installation of Valves and Hydrants

   a. Installation of Valves: Install gate valves, AWWA C500 and UL 262, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA

C500. Install gate valves, AWWA C509, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509. Install gate valves on PVC water mains in accordance with the recommendations for appurtenance installation in AWWA M23, Chapter 7, "Installation." Install check valves in accordance with the applicable requirements of AWWA C600 for valve-and-fitting installation, except as otherwise indicated. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

b. Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2-inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Architect/Engineer for further instructions.

C. Installation of Water Service Piping

1. Location: Connect water service piping to the building service where the building service has been installed. Where building service has not been installed, terminate water service lines approximately 5 feet from the building line at the point indicated; such water service lines shall be closed with plugs or caps.
2. Service Line Connections to Water Mains: Connect service lines 2-inch size and smaller to the main by a corporation stop and gooseneck and install a service stop below the frostline. Connect service lines to ductile-iron water mains in accordance with AWWA C600 for service taps. Connect service lines to PVC plastic water mains in accordance with UBPPA UNI-B-8 and the recommendations of AWWA M23, Chapter 9, "Service Connections."

D. Special Requirements for Installation of Water Service Piping

1. Installation of Plastic Piping: Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" and with the applicable requirements of ASTM D 2774, unless otherwise specified. Handle solvent cements used to join plastic piping in accordance with ASTM F 402.
    a. Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material; assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
    b. Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

E. Disinfection: Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with

solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying non-potable water is not required.

3.02 FIELD QUALITY CONTROL

A. Field Tests and Inspections: The Architect/Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications.

B. Testing Procedure: Test water mains and water service lines in accordance with the applicable specified standard, except for the special testing requirements given in paragraph entitled "Special Testing Requirements." Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method. Test PVC plastic water mains and water service lines made with PVC plastic water main pipe in accordance with the requirements of UBPPA UNI-B-3 for pressure and leakage tests. The amount of leakage on pipelines made of PVC plastic water main pipe shall not exceed the amounts given in UBPPA UNI-B-3, except that at joints made with sleeve-type mechanical couplings, no leakage will be allowed.

C. Special Testing Requirements: For pressure test, use a hydrostatic pressure 50 psi greater than the maximum working pressure of the system, except that for those portions of the system having pipe size larger than 2 inches in diameter, hydrostatic test pressure shall be not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

END OF SECTION 02510

SECTION 02530 - SANITARY SEWAGE

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 74	Cast Iron Soil Pipe and Fittings
ASTM C 564	Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C 972	Compression-Recovery of Tape Sealant
ASTM C 990	Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM D 412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension
ASTM D 624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 4101	Propylene Plastic Injection and Extrusion Materials

UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

UBPPA UNI-B-6	Low-Pressure Air Testing of Installed Sewer Pipe

1.2 SYSTEM DESCRIPTION

1.2.1 Sanitary Sewer Gravity Pipeline

Provide mains and laterals of polyvinyl chloride (PVC) plastic pipe.

Provide new and modify existing exterior sanitary gravity sewer piping and appurtenances. Provide each system complete and ready for operation. The exterior sanitary gravity sewer system includes equipment, materials, installation, and workmanship as specified herein more than 5 feet outside of building walls.

1.3 SUBMITTALS

Submit the following in accordance with Section 01300, SUBMITTALS, PRODUCTS, AND SUBSTITUTIONS:

SD-02 Shop Drawings

Precast concrete manhole

Metal items

Frames, covers, and gratings

SD-03 Product Data

Pipeline materials including joints, fittings, and couplings

Submit manufacturer's standard drawings or catalog cuts.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

1.4.1.1 Piping

Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

1.4.1.2 Cement, Aggregate, and Reinforcement

As specified in Section 03300, "Cast-In-Place Concrete".

1.4.2 Handling

Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

ASTM A 74, with ASTM C 564 compression-type rubber gaskets.

2.2 CONCRETE MATERIALS

Concrete materials shall be as specified in Section 03300, "Cast-In-Place Concrete."

2.3 MISCELLANEOUS MATERIALS

2.3.1 Precast Concrete and Associated Materials

2.3.1.1 Precast Concrete Manhole Sections

Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478. Base and first riser shall be monolithic.

2.3.1.2 Gaskets and Connectors

Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990.

2.3.1.3 External Preformed Rubber Joint Seals

An external preformed rubber joint seal shall be an accepted method of sealing cast iron covers to precast concrete sections to prevent ground water infiltration into sewer systems. All finished and sealed manholes constructed in accordance with paragraph entitled "Manhole Construction" shall be tested for leakage in the same manner as pipelines as described in paragraph entitled "Leakage Tests." The seal shall be multi-section with a neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be a non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. Extension sections shall cover up to two more adjusting rings. Properties and valves are listed in the following tables:

Properties, Test Methods and Minimum Values for
Rubber used in Preformed Joint Seals

Physical Properties	Test Methods	EPDM		Neoprene	Butyl mastic
Tensile, psi	ASTM D 412	1840		2195	-
Elongation percent	ASTM D 412	553	295	350	
Tear Resistance, ppi	ASTM D 624 (Die B)	280	160		-
Rebound, percent, 5 minutes	ASTM C 972 (mod.)	-		-	11
Rebound, percent, 2 hours	ASTM C 972	-		-	12

2.3.2 Metal Items

2.3.2.1 Frames, Covers, and Gratings for Manholes

Cast iron; frames, covers, and gratings shall be as indicated.

2.3.2.2 Manhole Steps

Zinc-coated steel as indicated conforming to 29 CFR 1910.27. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D 4101, copolymer polypropylene. Rubber shall conform to ASTM C 443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

3.1.1 General Requirements for Installation of Pipelines

Apply except where specific exception is made in the following paragraphs entitled "Special Requirements."

3.1.1.1 Location

The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated.

a. Sanitary piping installation parallel with water line:

(1) Normal conditions: Sanitary piping or manholes shall be laid at least 10 feet horizontally from a water line whenever possible. The distance shall be measured edge-to-edge.

(2) Unusual conditions: When local conditions prevent a horizontal separation of 10 feet, the sanitary piping or manhole may be laid closer to a water line provided that:

(a) The top (crown) of the sanitary piping shall be at least 18 inches below the bottom (invert) of the water main.

(b) Where this vertical separation cannot be obtained, the sanitary piping shall be constructed of AWWA-approved ductile iron water pipe pressure tested in place without leakage prior to backfilling.

(c) The sewer manhole shall be of watertight construction and tested in place.

(b) Installation of sanitary piping crossing a water line:

(1) Normal conditions: Lay sanitary piping crossing water lines to provide a separation of at least 18 inches between the top of the sanitary piping and the bottom of the water line whenever possible.

(2) Unusual conditions: When local conditions prevent a vertical separation described above, use the following construction:

(a) Sanitary piping passing over or under water lines shall be constructed of AWWA-approved ductile iron water pipe, pressure tested in place without leakage prior to backfilling.

(b) Sanitary piping passing over water lines shall, in addition, be protected by providing:

1.) A vertical separation of at least 18 inches between the bottom of the sanitary piping and the top of the water line.

2.) Adequate structural support for the sanitary piping to prevent excessive deflection of the joints and the settling on and breaking of the water line.

3.) That the length, minimum 20 feet, of the sanitary piping be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the water line.

(c) Sanitary sewer manholes: No water piping shall pass through or come in contact with any part of a sanitary sewer manhole.

3.1.1.2 Earthwork

Perform earthwork operations in accordance with Section 02315, "Excavation and Fill."

3.1.1.3 Pipe Laying and Jointing

Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay non-pressure pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batter boards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batter boards for the same purpose.

3.1.1.4 Connections to Existing Lines

Obtain approval from the Owner before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

3.1.2 Special Requirements

3.1.2.1 Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM D 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3.1.2.2 Cleanouts

Construct cleanouts of cast iron soil pipe and fittings.

3.1.3 Concrete Work

Cast-in-place concrete is included in Section 03300, "Cast-In-Place Concrete."

3.1.4 Manhole Construction

Construct base slab of cast-in-place concrete or use precast concrete base sections. Make inverts in cast-in-place concrete and precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For cast-in-place concrete construction, either pour bottom slabs and walls integrally or key and bond walls to bottom slab. No parging will be permitted on interior manhole walls. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required for precast concrete manholes. Cast-in-place concrete work shall be in accordance with the requirements specified under paragraph entitled "Concrete Work" of this section. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.

3.1.5 Miscellaneous Construction and Installation

3.1.5.1 Metal Work

a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size

with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.

b. Field painting: After installation, clean cast-iron frames, covers, gratings, and steps not buried in concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

3.2 FIELD QUALITY CONTROL

3.2.1 Field Tests and Inspections

The Owner will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.

3.2.2 Tests for Non-pressure Lines

Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line. When pressure piping is used in a non-pressure line for non-pressure use, test this piping as specified for non-pressure pipe.

3.2.2.1 Leakage Tests

Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.

a. Infiltration tests and exfiltration tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C 969. Make calculations in accordance with the Appendix to ASTM C 969.

b. Low-pressure air tests: Perform tests as follows:

(1) PVC plastic pipelines: Test in accordance with UBPPA UNI-B-6. Allowable pressure drop shall be as given in UBPPA UNI-B-6. Make calculations in accordance with the Appendix to UBPPA UNI-B-6.

END OF SECTION

SECTION 02820 – CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide chain link fencing and gates for permanent and construction fencing areas as indicated on drawings and/or as required to provide separation.

1.02 SUBMITTALS

A. Submit for approval product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fencing and fabric: 9 gage hot-dipped galvanized steel fencing and fabric with 2" mesh, knuckled top and bottom selvages. **NO BARBED WIRE.**

B. Accessories: Hot-dipped galvanized end, corner, and pull posts, line posts, gate posts, top rail, end caps, and accessories. Line posts shall be 2 ½" O.D. standard weight, schedule 40 galvanized steel pipe set in concrete. Provide 9 gage aluminum ties.

C. Gates: Swing type with galvanized steel pipe perimeter frame. Provide latch with padlock eye.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials in accordance with manufacturer's instructions and approved submittals. Install materials in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. All gates shall have a minimum clear width of 72 inches to accommodate maintenance grass cutting equipment.

C. Restore or replace damaged components. Clean and protect work from damage.

END OF SECTION

SECTION 03310 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.

B. See Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.

1.2 SUBMITTALS

A. Product Data: For each manufactured material and product indicated.

B. Design Mixes: For each concrete mix indicated.

C. Shop Drawings: Include details of steel reinforcement placement including material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports.

D. Material certificates.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

B. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.

1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
2. Formwork and form accessories.
3. Steel reinforcement and supports.
4. Concrete mixtures.
5. Handling, placing, and constructing concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Formwork: Furnish formwork and form accessories according to ACI 301.

B. Steel Reinforcement:

1. Reinforcing Bars: ASTM A 615 Grade 60, deformed.
2. Plain-Steel Wire: ASTM A 82, as drawn.
3. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

C. Concrete Materials:

1. Portland Cement: ASTM C 150, Type I or II or I/II.
2. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding 1-1/2-inch nominal size.
3. Water: Complying with ASTM C 94.
4. Synthetic Fiber: Fibrillated or monofilament polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

D. Admixtures:

1. Air-Entraining Admixture: ASTM C 260.
2. Water-Reducing Admixture: ASTM C 494, Type A.
3. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
4. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

E. Vapor Barrier: ASTM E 1745, Class A, Not less than 15 mils thick.

1. Sheet Vapor Barrier: Permeance of less than 0.01 Perms [grains/(ft^2 · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7. Include manufacturer's recommended polyethylene pressure-sensitive seam tape and vapor-proofing mastic.

F. Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

G. Curing Materials:

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Water: Potable.
5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.2 CONCRETE MIXES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Compressive Strength (28 Days): 4000 psi.

2. Slump: 4 inches.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

1. Air content of trowel-finished interior concrete floors shall not exceed 3.0 percent.

D. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd.

2.3 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Formwork: Design, construct, erect, shore, brace, and maintain formwork according to ACI 301.

B. Vapor Barrier: Install, protect, and repair vapor-barrier sheets according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

C. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.

D. Joints: Construct joints true to line with faces perpendicular to surface plane of concrete.

1. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Architect.
2. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

a. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

E. Tolerances: Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.2 CONCRETE PLACEMENT

A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

B. Consolidate concrete with mechanical vibrating equipment.

3.3 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
2. Apply smooth-rubbed finish, defined in ACI 301, to smooth-formed finished concrete.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.4 FINISHING UNFORMED SURFACES

A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.

1. Do not further disturb surfaces before starting finishing operations.

C. Scratch Finish: Apply scratch finish to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, and other bonded cementitious floor finish, unless otherwise indicated.

D. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing.

E. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, paint, or another thin film-finish coating system.

F. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic tile is to be installed by thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

G. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.5 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions occur before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Cure formed and unformed concrete for at least seven days as follows:

1. Moisture Curing: Keep surfaces continuously moist with water or continuous water-fog spray or absorptive cover, water saturated and kept continuously wet.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Tests will be performed according to ACI 301.

1. Testing Frequency: One composite sample for each day's pour of each concrete mix exceeding 5 cu. yd, but less than 25 cu. yd, plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: At least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
3. Test Cylinders: A minimum of four (4) shall be cast for each composite sample. Test one (1) at seven (7) days, two (2) at twenty-eight (28) days and hold one (1) as a spare.

END OF SECTION 03310

SECTION 04200 – UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. Provide unit masonry for walls and partitions:
   1. Exterior face brick at concrete masonry cavity walls.
   2. Exterior concrete masonry bearing walls.
   3. Interior concrete masonry bearing and non-bearing partitions.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. Section 01210 – Allowances for Brick and Custom match Mortar.

1.03 SUBMITTALS

A. Submit for approval samples, product data, and test reports.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Brick: Standard modular, 2-1/4" by 3-5/8" by 7-5/8". Comply with ASTM C 216, Grade SW, Type FBS. Special shapes as indicated or as required by building configuration. Brick shall match existing where applicable.
B. Concrete masonry unit: Lightweight, ASTM C 140 and C 90 Type II, Grade N; 7-5/8" by 15-5/8" face size. Special shapes as indicated or as required. Provide units with minimum average net-area compressive strength of 2000 psi in accordance with ASTM C90-14. Provide bullnose units at jambs and sills of all openings, and at all outside corners and end wall terminations, unless otherwise indicated.
C. Wall flashing: Self-sealing, self healing, fully adhering composite flexible flashing consisting of 32 mil thick pliable and highly adhesive rubberized asphalt compound bonded completely to 8 mil thick, high density, four ply, cross laminated polyethylene film. Manufacturer producing a product that conforms to this specification is W.R. Grace ‘Perm-A-Barrier’. Coordinate installation of self-adhered membrane flashing at wall openings and self-adhered through-wall flashing supplied under Section 07272.
D. Mortar: ASTM C 270, masonry cement mortar, Type N above grade; Type M below grade; other types as required by application. Inorganic oxide mortar pigments.
E. Grout for unit masonry: Comply with ASTM C 476.
F. Reinforcing:

1. Ties and reinforcing: Hot-dipped galvanized, ASTM A 153.
2. Horizontal reinforcing: Welded ladder type, 9 gage wire with deformed side rods.
3. Brick to block ties: 3/16" diameter adjustable double hook & eye; Hohmann & Barnard Lox-All Adjustable Eye-Wire or approved equal.
4. Brick to steel stud ties: 3/16" diameter vee ties with drip, 12 gage wall slot; Hohmann & Barnard DW-10HS or approved equal.
5. Reinforcing bars: Deformed bars, ASTM A 615, Grade 60.

G. Miscellaneous Materials:
1. Cavity Drainage Material: 2-inch thick, high density polyethylene, 90% open mesh, dovetail shaped to maintain unobstructed drainage at weep holes; Mortar Net Green or approved equal.
2. Weep Holes: Rectangular plastic tubing with cotton wick and stainless steel screen, clear butyrate, 3/8” x 1-1/2” x 3-1/2”; Hohmann & Barnard 342W/S or approved equal. Install minimum of 4” above finish grade.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with PCA "Recommended Practices for Laying Concrete Block" and BIA Tech Notes 11, 11A, 11B, 11C, 11D, and 11E.
B. Weather Protection: Cold weather; heat mortar water and sand, enclose walls and provide temporary heat as recommended by BIA Tech Notes 1, 1A, 1B, and 1C. Hot weather; use mortar within 1-1/2" hours after mixing for ambient 80 degrees F or above.
C. Tolerances: From dimensions and locations in Contract Documents for plumb, level and alignment, plus or minus 1/8 in 20'.
D. Fire-Rating: Where indicated, provide assemblies identical to tested assemblies and accepted by authorities having jurisdiction.
E. Bond: Lay exposed face brick in running bond except in areas of special coursing as indicated on Drawings.
F. Joints: Maintain uniform 3/8" width; tool concave. Provide full bed, head and collar joints except at weep holes; keep cavity clean at cavity walls.
G. Weep holes: Provide plastic weep holes at 16” o.c. above all ledges, flashings and lintels. Fill cavity 10" high with cavity drainage material.
H. Install steel lintels and provide reinforced masonry lintels where indicated.
I. Coordinate installation of flashings; prepare masonry surfaces smooth and bed flashings in mortar. Comply with manufacturer's instructions for asphaltic membrane flashings.
J. Coordinate installation of embedded brick ties with insulated concrete forms supplied under Section 03130.
K. Ties and Horizontal Reinforcing: Comply with codes; space ties not more than 16" o.c. vertically and horizontally.
L. Provide L and T sections of reinforcing at corners and intersections. Lap reinforcing a minimum of 6". Reinforce masonry openings greater than 1'-0" wide with horizontal reinforcements place in 2 horizontal joints approximately 8" apart immediately above the lintel and below the sill. Extend the reinforcement a minimum of 2'-0" beyond jambs of the openings.
M. Remove and replace damaged units. Enlarge holes in mortar and re-point. Prepare joints to receive sealants. Clean brick using bucket and brush method; comply with BIA Tech Note 20. Clean Concrete masonry by dry brushing; comply with NCMA TEK No. 28.

END OF SECTION 04200

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes structural steel.

1.02 SUBMITTALS

A. Product Data: For each product indicated.
B. Shop Drawings: Show fabrication of structural-steel components, including connections, splices, holes, welds, and bolts.
C. Mill certificates.
D. Welding certificates.

1.03 QUALITY ASSURANCE

A. Comply with applicable provisions in AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1.04 STORAGE AND PROTECTION

A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.
B. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural-Steel Shapes, Plates, and Bars: ASTM A 36, carbon steel or ASTM A 572, Grade 50, high-strength, low-alloy columbium-vanadium steel. See construction drawings.
B. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B.
C. Nonhigh-Strength Anchor Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated.
D. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.
E. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

F. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.

2.02 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
   1. Comply with fabrication tolerance limits in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
   2. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
   3. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
      a. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.
   4. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

B. Shop Priming: Shop prime steel, except surfaces embedded in concrete or mortar, surfaces to be field welded, surfaces to be high-strength bolted with slip-critical connections, and surfaces to receive sprayed-on fireproofing.
   1. Surface Preparation: SSPC-SP 3, "Power Tool Cleaning."
   2. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   3. Provide Tnemec primer for all exposed steel that will be finished with high performance coating in lieu of standard iron-oxide shop primer. Reference Division 9 “High Performance Coating for Exterior Steel.”

PART 3 - EXECUTION

3.01 ERECTION

A. Examination: Verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

C. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.
   1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

E. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

F. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
   1. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

G. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Open-web, K-series steel joists.

1.02 SUBMITTALS

A. Product Data: For each type of joist, accessory, and product indicated.
B. Shop Drawings: Showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
C. Welding certificates.
D. Mill certificates.
E. Research/evaluation reports.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.
   1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.
C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: Comply with SJI's "Specifications" for chord and web members.
B. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers; plain, uncoated.

2.02 PRIMERS

A. Primer: SSPC-Paint 15, Type I, red oxide; FS TT-P-636, red oxide; or manufacturer's standard shop primer complying with performance requirements of either of these red-oxide primers.

2.03 STEEL JOISTS

A. Manufacture steel joists according to SJI's "Specifications," with steel-angle top- and bottom-chord members, and as follows:
   1. Manufacture K-series steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.04 JOIST ACCESSORIES

A. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications."
B. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.05 SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
B. Apply 1 shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.
B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

END OF SECTION 05210

SECTION 05310 - STEEL DECK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Roof deck.
2. Acoustical roof deck.
3. Composite floor deck.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete fills.
2. Division 5 Section "Structural Steel" for shop- and field-welded shear connectors.
3. Division 5 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Division 9 painting Sections for repair painting of primed deck.
5. Division 16 Section "Underfloor Raceways" for preset inserts activation kits, afterset inserts, service fittings, header ducts, and trench header ducts used with cellular floor-deck systems.

1.03 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

C. Product Certificates: For each type of steel deck, signed by product manufacturer.

D. Welding certificates.

E. Field quality-control test and inspection reports.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
2. Acoustical roof deck.
3. Screw fasteners.

G. Research/Evaluation Reports: For steel deck.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Member in good standing of Steel Deck Institute (SDI).
2. ISO 9001:2000 accredited by ANSI Registrar Accreditation Board (ANSI-RAB).

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Electrified Cellular Floor Deck: Obtain cellular floor-deck units and compatible electrical components, such as preset inserts, activation kits, afterset inserts, service fittings, header ducts, and trench header ducts, from same manufacturer.

D. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

E. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Steel Deck Institute - "Manual of Construction with Steel Deck" (SDI - MOC2).

B. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.06 COORDINATION

A. of sound-absorbing insulation strips and non-corrosive spacers (lath), when required in topside ribs of acoustical deck with roofing installation specified in Division 7 Section "Metal Roofing, Wall & Soffit Panels" to ensure protection of insulation strips against damage from effects of weather and other causes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide products manufactured by CSi Metal Dek Group, a unit of Consolidated Systems, Inc., or one of the following:

1. Steel Deck:

a. ASC Profiles, Inc.
b. Canam Steel Corp.;The Canam Manac Group.
c. Consolidated Systems, Inc.
d. DACS, Inc.
e. D-Mac Industries Inc.
f. Epic Metals Corporation.
g. Marlyn Steel Decks, Inc.
h. New Millennium Building Systems, LLC.
i. Nucor Corp.; Vulcraft Division.
j. Roof Deck, Inc.
k. United Steel Deck, Inc.
l. Valley Joist; Division of EBSCO Industries, Inc.
m. Verco Manufacturing Co.
n. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.02 ROOF DECK

A. Steel Roof Deck: Fabricate panels, with or without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Basis-of-Design Product: CSi Metal Dek Group; Deep-Dek® 6.
2. Prime-Painted and Shop Top-Coated Galvanized Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33 minimum, ASTM A 924/A 924M G90 (Z275) zinc coating, cleaned, pretreated, and painted in accordance with the CSi Metal Dek Group – Versa-Steel® System.

a. Paint System: Provide manufacturer’s premium protective coating for exterior exposed deck in aggressive environments. Basis of design, Versa-Shield 20 by CSi Metal Dek Group or decking manufacturer’s equal.
1) Epoxy Primer: dry film thickness range: 0.2 – 0.3 mil
2) Polyamide Epoxy Intermediate Coat: dry film thickness range: 2.0 – 6.0 mils

3) Fluoropolymer (PVDF) Topcoat (Satin Finish): dry film thickness range: 2.0 – 3.0 mils
4) Polyester Backcoat: dry film thickness: 0.3 mil

b. Color: As selected by Architect.

c. Warranty: Provide manufacturer's standard warranty:

1) Film Integrity: Will not check, crack, blister or delaminate from the substrate for period of 20 years
2) Chalk: Will not chalk in excess of rating of 8 for period of 15 years (ASTM D4214, Method A)
3) Fade: Will not change color more than 5 delta E Hunter units for a period of 15 years (ASTM D2244)
4) Gloss: Will not exceed loss of 24 units as measured by a gloss meter for period of 15 years (ASTM D523-89 with 60° geometry)

3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), minimum, ASTM A 924/A 924M G90 (Z275) zinc coating; cleaned, pretreated, and painted in accordance with the CSi Metal Dek Group – Versa-Steel® System.

a. Paint System: Provide manufacturer's premium protective coating for exterior exposed deck in aggressive environments. Basis of design, Versa-Shield 20 by CSi Metal Dek Group or decking manufacturer's equal.

1) Epoxy Primer: dry film thickness range: 0.2 – 0.3 mil
2) Poly amide Epoxy Intermediate Coat: dry film thickness range: 2.0 – 6.0 mils
3) Fluoropolymer (PVDF) Topcoat (Satin Finish): dry film thickness range: 2.0 – 3.0 mils
4) Polyester Backcoat: dry film thickness: 0.3 mil

b. Color: As selected by Architect.

c. Warranty: Provide manufacturer's standard warranty:
1) Film Integrity: Will not check, crack, blister or delaminate from the substrate for period of 20 years
2) Chalk: Will not chalk in excess of rating of 8 for period of 15 years (ASTM D4214, Method A)
3) Fade: Will not change color more than 5 delta E Hunter units for a period of 15 years (ASTM D2244)
4) Gloss: Will not exceed loss of 24 units as measured by a gloss meter for period of 15 years (ASTM D523-89 with 60° geometry)

4. Profile Depth: 6 inches (152 mm).
5. Design Uncoated-Steel Thickness: As indicated on Drawings.
6. Span Condition: As indicated on Drawings.
7. Side Laps: Nestible.

2.03 ACOUSTICAL ROOF DECK

A. Acoustical Steel Roof Deck: Fabricate panels, with or without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Basis-of-Design Product: CSi Metal Dek Group; Deep-Dek® 6 Acoustical.
2. Prime-Painted and Shop Top-Coated Galvanized Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33 minimum, ASTM A 924/A 924M G90 (Z275) zinc coating, cleaned, pretreated, and painted in accordance with the CSi Metal Dek Group – Versa-Steel® System.

    a. Paint System: Provide manufacturer's premium protective coating for exterior exposed deck in aggressive environments. Basis of design, Versa-Shield 20 by CSi Metal Dek Group or decking manufacturer's equal.
        1) Epoxy Primer: dry film thickness range: 0.2 – 0.3 mil
        2) Polyamide Epoxy Intermediate Coat: dry film thickness range: 2.0 – 6.0 mils
        3) Fluoropolymer (PVDF) Topcoat (Satin Finish): dry film thickness range: 2.0 – 3.0 mils
        4) Polyester Backcoat: dry film thickness: 0.3 mil

    b. Color: As selected by Architect.

    c. Warranty: Provide manufacturer's standard warranty:

        1) Film Integrity: Will not check, crack, blister or delaminate from the substrate for period of 20 years
        2) Chalk: Will not chalk in excess of rating of 8 for period of 15 years (ASTM D4214, Method A)
        3) Fade: Will not change color more than 5 delta E Hunter units for a period of 15 years (ASTM D2244)
        4) Gloss: Will not exceed loss of 24 units as measured by a gloss meter for period of 15 years (ASTM D523-89 with 60° geometry)

3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), minimum, ASTM A 924/A 924M G90 (Z275) zinc coating; cleaned, pretreated, and painted in accordance with the CSi Metal Dek Group – Versa-Steel® System.

    a. Paint System: Provide manufacturer's premium protective coating for exterior exposed deck in aggressive environments. Basis of design, Versa-Shield 20 by CSi Metal Dek Group or decking manufacturer's equal.

        1) Epoxy Primer: dry film thickness range: 0.2 – 0.3 mil
        2) Poly amide Epoxy Intermediate Coat: dry film thickness range: 2.0 – 6.0 mils
        3) Fluoropolymer (PVDF) Topcoat (Satin Finish): dry film thickness range: 2.0 – 3.0 mils
        4) Polyester Backcoat: dry film thickness: 0.3 mil

    b. Color: As selected by Architect.

c. Warranty: Provide manufacturer's standard warranty:
   1) Film Integrity: Will not check, crack, blister or delaminate from the substrate for period of 20 years
   2) Chalk: Will not chalk in excess of rating of 8 for period of 15 years (ASTM D4214, Method A)
   3) Fade: Will not change color more than 5 delta E Hunter units for a period of 15 years (ASTM D2244)
   4) Gloss: Will not exceed loss of 24 units as measured by a gloss meter for period of 15 years (ASTM D523-89 with 60° geometry)

4. Profile Depth: 6 inches (152 mm).
5. Design Uncoated-Steel Thickness: As indicated on Drawings.
6. Span Condition: As indicated on Drawings.
7. Side Laps: Nestible.
8. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs.
9. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.

10. Acoustical Performance: NRC 0.75, tested according to ASTM C 423.

2.04 ACCESSORIES

A. General: Provide manufacturer's standard roof or floor accessory materials for deck that comply with requirements indicated including but not limited to Deep-Dek® Roof and Floor Hanger Assembly Accessories.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0358-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Galvanized G-60 (Z180) minimum steel sheet, minimum yield strength of 33,000 psi (230 MPa), of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Galvanized G-60 (Z180) minimum steel sheet, of same thickness as deck, unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, [0.0598 inch (1.52 mm)] [0.0747 inch (1.90 mm)] thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

J. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and sloped recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.

K. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

L. Galvanizing Repair Paint: ASTM A780.

M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

N. Dek-Strut hanger devices as manufactured by Metal Dek Group, Unit of CSi, or other deck manufacturer’s equal product.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter (visible): 3/4 inch (19 mm), nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
3. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (450 mm), and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches (305 mm) apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

E. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.

1. Weld ‘cover plates’ at changes in direction of roof-deck panels, unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

G. Sound-Absorbing Insulation: Installation into topside ribs of deck per manufacturer’s instructions.

3.04 FLOOR DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:

1. Weld Diameter (visible): 5/8 inch (16 mm), nominal.
2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
3. Weld Spacing: Space and locate welds as indicated.
4. Weld Washers: Install weld washers at each weld location.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (910 mm), and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Butted.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

F. Install piercing hanger tabs at 16 inches (406 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides, unless otherwise indicated.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.06 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on top surface of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as shop-finished deck, to bottom surfaces of deck exposed to view with manufacturer’s recommended paint and application method to maintain warranty.
2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 9 Section "Painting."

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 9 Section "Painting."

D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05310

SECTION 05400 – LIGHTGAGE METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Provide lightgage metal framing:
   1. Loadbearing metal studs.
   2. Channel and “Z” furring
B. Applications:
   1. Exterior wall panels.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated. Sizes indicated on drawings are considered minimum and shall be upsized if required by loads.
   1. Wind Loads: As indicated on structural drawings.
   2. Deflection Limits: Horizontal deflection of L/360.

1.03 SUBMITTALS

A. Product data: For each type of cold-formed metal framing product and accessory indicated.
B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining Work.
   1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
B. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: ASTM A 446, A 570, or A 611.
   1. 16 gage and heavier: 40,000 psi yield strength.
   2. 18 gage and lighter: 33,000 psi yield strength.
   3. Galvanize lightgage framing components: ASTM A 525, G90.
B. Components:
   1. C-shaped studs.
   2. Steel joists, C-shaped type.

3. Miscellaneous materials: Stud manufacturer's standard runners, clip angles, shoes, reinforcements, fasteners, blocking, and lintels.
4. “Z” furring.
5. Channel furring

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
B. Restore damaged components. Protect work from damage.

END OF SECTION 05400

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide miscellaneous metal items fabricated from heavy gage ferrous metals and not provided with structural steel system:
   1. Loose lintels.
   2. Downspout boots.
   3. Counter and equipment supports.
   4. Miscellaneous framing and supports.

1.02 SUBMITTALS

A. Submit for approval samples as requested, shop drawings, product data, test reports.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials:
   1. Steel plates, shapes, and bars: ASTM A 36.
   2. Steel pipe: ASTM A 53, schedule 40.
   3. Bolts: ASTM A 325.
   4. Fasteners: Zinc coated fasteners designed for loading and use.
   5. Grout: Non-shrink non-metallic grout, Euco NS by Euclid Chemical Co or approved equal.
   6. Concrete inserts: Galvanized ferrous castings.

B. Galvanized ferrous metal items at exterior wall and where exposed to weather; 1 coat primer (shop-applied) elsewhere.
   1. Galvanizing: ASTM A 525.
   2. Primer; Tnemec 10-99, PPG Inhibitive Metal Primer, Rustoleum Rusty Metal Primer, or approved equal.
   3. Galvanizing repair paint, zinc rich primer; Tnemec, PPG, ZRC Chemical Products or approved equal.

C. Downspout Boots:
   1. Rectangular downspout boots; Cast aluminum with powder blast satin finish, Barry B25C or approved equal.
      a. At each 4”x5” downspout: Provide 4”x5” inlet with below grade outlet size as indicated on Drawings.
      b. Finish: Field paint downspout boot to match downspout.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Take field measurements prior to preparation of shop drawings and fabrication. Do not delay job; allow for cutting and fitting if field measurement not practical.
B. Form work true to line with sharp angles and edges. Weld continuously, grind flush and make smooth on exposed surfaces.
C. Install work plumb and level with hairline joints and ground flush welds.
D. Lintels: Provide sizes indicated with minimum 8" bearing at each end.
E. Touch-up damaged coatings with shop primer and galvanize repair paint.
F. Paint items scheduled in accordance with Section 09900.

END OF SECTION 05500

SECTION 05600 – HANDRAILS

1.01 GENERAL

This section is to cover the fabrication and installation of aluminum hand and guardrails and ships-ladders. This section does not pertain to grab bars used in restrooms.

1.02 QUALITY ASSURANCE

A. The design of the rails shall be in accordance with the current revisions of SREF and Florida Accessibility Code For Building Construction.
B. Fabrication: Work shall be performed by experienced and qualified fabricators who have experience in aluminum rail fabrication.
C. Pipe cuts shall square and without burrs. All Welds shall be ground smooth to the surface of the pipe. Curved sections shall be bent with no crimping or flattening of the inside radius. All welded joints in rail to rail connections shall be internally reinforced.
D. The rails shall be anchored in such a manor as to meet the guidelines on the Florida Accessibility Code For Building Construction.

1.03 MATERIALS

A. All pipe shall be 1-1/2” O.D., Schedule 40 extruded aluminum pipe, alloy 6063-T-6.
B. Proved plates, serrated rungs, channel stringers and miscellaneous plates and clip-angles as necessary to construct ships-ladder in aluminum.
C. Finish: All exposed aluminum shall be brushed aluminum finish.
D. All fasteners shall be type 300 stainless steel.
E. Provide cast cover flanges for all railing installed against wall surfaces.

1.04 INSTALLATION

A. Railings shall be installed as shown on approved shop drawings by mechanics experienced in the installation of aluminum railing.
B. Railings shall be firmly mounted and aligned both vertically and horizontal to the structure installed on.
C. After installation, railings shall be cleaned and protected from damage until final acceptance of the project.
D. Damage to adjacent structures during installation of railing will be required like new at no cost to the owner.

END OF SECTION 05600

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Provide rough carpentry work:
   1. Wood framing.
   2. Sheathing.
   3. Shelving.
   4. Nailers and blocking, furring, and sleepers.

1.02 SUBMITTALS

A. Submit for approval product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Lumber, finished 4 sides, 15% maximum moisture content:
   1. Light framing: Construction grade douglas fir or southern pine, appearance grade where exposed.
   2. Structural framing and timbers: No. 1 grade Douglas fir or southern pine, appearance grade where exposed.
   3. Boards: Construction grade.

B. Wood for nailers, blocking, furring and sleepers: Construction grade, finished 4 sides, 15% maximum moisture content. Pressure preservative treat items in contact with roofing, flashing, waterproofing, masonry, concrete or the ground.

C. Plywood, APA rated for use and exposure:
   1. Storage shelving: APA A-B interior.
   2. Wall sheathing: APA sheathing, C-D plugged, Exterior.
   3. Backing panels: APA C-D plugged interior with exterior glue, fire-retardant treated, 3/4" thick.

D. Self-adhering, polyethylene-faced sheet underlayment: ASTM D 1970, 40 mils thick minimum, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied; W.R. Grace & Company ‘Ice and Water Shield’ or approved equal.

E. Wood treatment:
   1. Preservative treatment: Pressure-treated with waterborne preservatives, to comply with AWPB LP-2 or LP-22, as applicable. Kiln dry to 15% max. moisture content. Treat wood exposed to deterioration by moisture, such as items in contact with roofing, flashing, waterproofing, masonry, concrete, or the ground. Treat wood subject to insect attack.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide nailers, blocking and grounds where required. Set work plumb, level and accurately cut.
B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
C. Comply with manufacturer's requirements for cutting, handling, fastening and working treated materials.
D. Restore damaged components. Protect work from damage.

END OF SECTION 06100

SECTION 06160 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment.
3. Flexible flashing at openings in sheathing.

B. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for plywood backing panels.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Building wrap.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corporation.
2. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch (0.835 mm) thick, attach sheathing to comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing to comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 7 Section "Joint Sealants."

B. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780

threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.4 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.0 mm).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor V40 Weather Barrier Strips.

B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in Florida Building Code."

D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.
2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 06160

SECTION 06410 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Provide shop-fabricated exposed woodwork and casework:
   1. Plastic laminate casework and countertops as indicated.

1.02 SUBMITTALS

A. Submit for approval samples, shop drawings, and product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers with minimum five years' experience. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Quality standard for fabrication and products: Architectural Woodwork Institute Quality Standards, Custom grade unless noted otherwise.
B. Plastic laminate: NEMA LD-3, glued-on melamine paper is not allowed. Panel surfaces scheduled to receive plastic laminate shall also receive laminate, liner, or backer on the reverse face. Panels with unbalanced or unfinished faces will not be accepted regardless of location.
C. Base cabinets and wall cabinets:
   1. Reveal overlay construction: Minimum Grade M-2 medium-density particleboard substrate, ANSI A 208.1, ¾" thickness unless specified otherwise:
      a. Sink cabinet bodies shall have water-resistant plywood substrate.
      b. Wall cabinets shall have a clear inside depth of 12 inches.
      c. Cabinet backs shall be minimum ½" thick.
      d. Drawer boxes shall be of minimum ½" wood construction including drawer bottom, separate front panel attached to drawer box, no staples allowed.
      e. Paper storage drawers shall be fitted with full width hood at back.
      f. Large flat file drawer boxes shall have laminate clad plywood bottoms.
   2. Exposed surfaces: High-pressure decorative laminate as follows:
      a. Horizontal surfaces other than tops: GP-50.
      b. Vertical surfaces: GP-28.
      c. Body edges: 0.5 mm PVC edge banding, color matched.

d. Door/drawer edges: 3 mm PVC edge banding, machine applied, all four edges.

3. Semi-exposed surfaces:
   a. Surfaces other than drawer bodies: High-pressure decorative laminate, Grade CL-20.
   b. Drawer bottoms, sides, and backs: Thermally-fused melamine, color white.
4. Countertops: Countertops shall be built in lengths that will facilitate ease of replacement. Provide mechanical fasteners at splines and joints. Joint shall not be located over open space without support. Joints shall not be located closer than 24 inches either side of sink cutouts. Unsupported spans shall not exceed 48" without support bracket. Exposed corners shall have rounded corners for student safety. Radius for exposed corners is indicated on drawings.
   a. Core: Plywood, provide with backer sheet for balanced construction, water-resistant plywood shall be used where a sink is installed.
   b. Laminate: GP-50.
   c. Edge: 1" minimum, 3 mm PVC edge banding, machine applied.
   d. Backsplash: ¾" x 4", butted to countertop.
5. Adjustable shelving: ¾" thick up to 36 inches in length, 1" thick over 36 inches in length; 32 mm in-line boring; double-pin reinforced clear plastic shelf supports with anti-tip locking tabs to restrain shelves.
   a. Edge: 0.5 mm PVC, color matched, all four edges.

D. Hardware: Steel or brass with satin-chromium plate finish. Comply with BHMA A156.9 for items indicated by referencing BHMA numbers.

1. Drawer slides: BHMA B05091; zinc-plated, ball bearing side-mount full-extension, minimum 100-lbf rating; provide 150-lbf rating at file drawers.
2. Hinges: BHMA B01521; 2-3/4" x .095" semi-concealed, 5-knuckle.
3. Catches: BHMA B03091; heavy duty, metal spring-loaded, single-roller catch with molded plastic bumper; Amerock BP97452G or approved equal.
4. Pulls: BHMA B02011; 4" back-mounted steel or brass wire pulls.
5. Locks: BHMA E07261; cam lock, key removable in locked and unlocked positions, all locks shall be keyed alike.
6. L-brackets: Powder coated 1/8" steel, 3"x3" 45-degree notch at wall for cable routing through bracket, A&M Hardware, Inc. or approved equal.
7. Grommets: 2" diameter molded black plastic countertop grommet with opening for wire/cable passage and matching removable plastic cap; provide two grommets at each open knee space.
8. Keyboard trays: KT1 as supplied by Uncaged Ergonomics or equal. Provide (6) six total. Install under counter tops in knee spaces in Work Area 809A, (4) four total; and in Work Area 809B, (2) two total. Coordinate final locations with owner.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with AWI quality standards. Comply with details shown for profile and construction features.

1. Casework: AWI Custom grade, laminate covered reveal overlay construction, institutional hardware quality level.
2. Countertops: AWI Premium grade, butted backsplash and machine applied PVC edge at front lip.

B. Do not deliver or install architectural woodwork and casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at design occupancy levels during the remainder of the construction period.

C. Where architectural woodwork and casework is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Install work plumb, level, true and straight, scribe to fit. Align and secure all adjoining cabinets to each other, and to wall construction. Anchor securely with concealed fasteners.

E. Seal all joints between countertops, backsplashes, and walls with clear acrylic caulk.

F. Repair or replace damaged work, clean, lubricate and adjust hardware; protect work until final acceptance.

END OF SECTION 06410

SECTION 07200 – BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provide building insulation of board, blanket and batt types as applicable:
   1. Exterior masonry cavity walls – rigid board insulation.
   2. Interior partitions – un-faced sound attenuation batt.
   3. Exterior stud walls – foil-scrim-kraft-faced thermal batt.
   4. Roof insulation – OSB faced polyisocyanurate rigid board insulation

1.02 SUBMITTALS

A. Submit for approval product data, test reports.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Board type insulation: Extruded polyisocyanurate board; compressive strength 20 psi; ASTM E84 and ASTM E119 with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively; pass FM4450 test for burning. Acceptable products: Hunter H-Shield NB, Carlisle Construction Materials; Firestone Hail Guard by Firestone Building Products; JM Nailboard by Johns Manville; or approved equal.

B. Blanket type insulation: Un-faced semi-rigid spun mineral fiber sound attenuation fire blanket; ASTM C655, Type I & ASTM E136; United States Gypsum Company Thermafiber SAFB or approved equal.

C. Batt type insulation: Foil-scrim-kraft-faced mineral-fiber thermal insulation; ASTM C665, Type III, Class A (flame spread of 25 or less), Category 1; Owens Corning Fiberglass Corp or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections. Provide full thickness in one layer over entire area, tightly fitting around penetrations.

B. Protect installed insulation and vapor barrier.

END OF SECTION 07200

SECTION 07272 – FLUID-APPLIED VAPOR PERMEABLE AIR BARRIER MEMBRANE

PART 1 - GENERAL

1.01 SUMMARY

A. Provide fluid-applied vapor permeable air barrier membrane over exterior face of gypsum sheathing and CMU as indicated or required.
B. Supply labor, materials and equipment to complete the Work as shown on the Drawings and as specified herein to bridge and seal the following air leakage pathways and gaps:
   1. Openings and penetrations of window, door, and louver frames.
   2. Piping, conduit, duct, and similar penetrations.
   3. Embedded brick ties, screws, bolts, and similar penetrations.
   4. All other air leakage pathways in the building envelope.
C. Materials and installation methods of the primary vapor permeable air barrier membrane system and accessories.
D. Materials and installation methods of through-wall flashing membranes.

1.02 RELATED SECTIONS

A. 03300 – Cast-In-Place Concrete.
B. 04200 – Unit Masonry.
C. 08110 – Steel Doors and Frames.
D. 08410 – Aluminum Storefront.
E. 10200 – Louvers and Vents.

1.03 REFERENCES

A. The following standards are applicable to this section:
   1. ASTM E 2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.
   2. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials.
   3. ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
   4. ASTM E 1677 Specification for Air Retarder (AR) Material or System for Low-Rise Framed Building Walls.
   5. ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   6. ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
   7. ASTM E 96: Water Vapor Transmission of Materials.
   8. CGSB 37-GP-56M: Membrane, Modified, Bituminous, Prefabricated, and Reinforced.
   9. AMMA 2400: Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction.
   10. ASTM E 2112: Standard Practice for Installation of Exterior Windows, Doors and Skylights.

1.04 PERFORMANCE REQUIREMENTS

A. Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier membrane assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration.

1.05 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier membrane.
B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   1. Include details of interfaces with other materials that form part of air barrier.
C. Submit documentation from an approved independent testing laboratory certifying the air leakage rates of the air barrier membrane assembly, including primary membrane, primer and sealants have been tested to meet ASTM E 2357.
   1. Test report submittals shall include test results on porous substrate and include sustained wind load and gust load air leakage results.
D. Submit copies of manufacturers' current ISO certification.

1.06 QUALITY ASSURANCE

A. Submit document stating the applicator of the primary air barrier membrane specified in this section is qualified by the manufacturer as suitable for the execution of the Work.
B. Perform the Work in accordance with manufacturer's written instructions and this specification.
C. Maintain one copy of manufacturer's written instructions on site.
D. Allow access to the Work site by the air barrier membrane manufacturer's representative.
E. Components used shall be sourced from one manufacturer, including primary membrane, transition and flashing membranes, air barrier sealants, primers, mastics, and adhesives.
F. Single-Source Responsibility:
   1. Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.
   2. Provide products which comply with all federal, state and local regulations controlling use of volatile organic compounds (VOCs).

1.07 PRE-INSTALLATION CONFERENCE

A. Schedule pre-installation conference a minimum of one (1) week prior to commencing work of this section.
B. Include installers of other construction connecting to air barrier, including insulated concrete forms, brick veneer, cast stone, sealants, windows, door frames, and louvers.
C. Review air barrier requirements including surface preparation, substrate condition and pretreatment, forecasted weather conditions, special details and sheet flashings, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.08 DELIVERY, STORAGE AND HANDLING

A. Refer to current Product MSDS for proper storage and handling.
B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
C. Store roll materials on end in original packaging. Protect rolls from direct sunlight until ready for use.
D. Store air barrier membranes, adhesives and primers at temperatures of 40 degrees F and rising.
E. Keep solvent away from open flame or excessive heat.

1.09 COORDINATION

A. Ensure continuity of the air barrier throughout the scope of this section.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.11 WARRANTY

A. Provide manufacturer's standard 10-year material warranty.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Basis-of-Design Product: The design for the air barrier system is based on the following manufacturer. Subject to compliance with requirements, provide the named products or an equivalent product by one of the manufacturers listed in paragraph 2.1.B below. Air barrier membrane components and accessories shall be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.
   1. Basis-of-Design Manufacturer: Henry Company.
      909 N Sepulveda Blvd, Suite 650
      El Segundo, CA 90245
      (800) 598-7663
      Web Site: www.Henry.com
B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Grace Construction Products.
   2. Marflex Building Solutions.
   3. Prosoco, Inc.
   4. Sto Corp.
   5. Tremco, Inc.
   6. W.R. Meadows, Inc.

2.02 MEMBRANES (Basis-of-Design)

A. Primary air and rain barrier membrane for temperatures above 40 degrees F and rising shall be Air-Bloc 31 manufactured by Henry or equal; a single component water based elastomeric emulsion membrane, trowel or spray applied. Membrane shall have the following physical properties:
   1. Air permeability: 0.0002 CFM/ft^2 @ 1.6 lbs/ft^2 to ASTM E2178 and ASTM E283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft^2 for 1 hour and gust wind load pressure of 62.8 lbs/ft^2 for 10 seconds when tested at 1.6 lbs/ft^2 to ASTM E331.
   2. Tested to ASTM E2357 for Air Leakage of Air Barrier Assemblies.
   3. Water vapor permeance (43 mil dry thickness): 21 perms to ASTM E96 Method B.
   4. Nominal wet film thickness: 90 mils.
   5. Elongation (ASTM D412): 1000% (Typical).
   6. Low temperature flexibility and crack bridging: Pass -4 degrees F to ASTM C836.
   7. Long term flexibility: Pass to CGSB 71-GP-24M.
   8. Watertightness (CGSB 37-GP-56M): Pass.

B. Self-adhering vapor permeable air barrier membrane for transition and joint treatment shall be Blueskin® Breather manufactured by Henry or equal; a self-adhering membrane consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water. Membrane shall have the following physical properties:
   1. Air leakage: <0.002 CFM/ft^2 @ 1.6 lbs/ft^2 to ASTM E283-91.
   2. Water vapor permeance: 37 perms to ASTM E96.
   3. Membrane Thickness: 17 mils.
   4. Low temperature flexibility -40 degrees F: Pass to ASTM D3111.
   5. Hydrostatic Water Resistance: 18 psi ASTM D751 Procedure A.

C. Self-adhering membrane for all window and window sill flashings, louver and louver sill flashings, door openings, inside and outside corners and other transitions shall be Blueskin® SA manufactured by Henry or equal; an SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. For application temperatures down to 10 degrees F use Blueskin® SA LT. Membrane shall have the following physical:
   1. Air leakage: <0.0001 CFM/ft^2 @1.6 lbs/ft^2 to ASTM E 2178 and ASTM E 283 and have no increased air leakage when subjected to a sustained wind load of 10.5 lbs/ft^2 for 1 hour and gust wind load pressure of 62.8 lbs/ft^2 for 10 seconds when tested at 1.6 lbs/ft^2 to ASTM E331.
   2. Tested to ASTM E 2357 for the air barrier assembly.
   3. Vapor permeance: 0.05 perms to ASTM E96.
   4. Membrane Thickness: 0.0394” (40 mils).
   5. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M.
   6. Elongation: 200% to ASTM D412-modifed.
   7. Meets CAN/CGSB-51-33 Type I Water Vapor Permeance requirements.

D. Self-adhering through-wall flashing membrane shall be Blueskin® TWF manufactured by Henry or equal; an SBS modified bitumen, self-adhering sheet membrane complete with a cross-laminated polyethylene film. Membrane shall have the following physical properties:
   1. Membrane Thickness: 0.0394 inches (40 mils).
   2. Film Thickness: 4.0 mils.
   3. Flow (ASTM D5147): Pass @ 212 degrees F.
   4. Puncture Resistance: 134 lbf to ASTM E 154.
   5. Tensile Strength (film): 5723 psi ASTM D882.
   6. Tear Resistance: 13lbs. MD to ASTM D1004.
   7. Low temperature flexibility: -22 degrees F to CGSB 37-GP-56M.

2.03 PRIMERS

A. Primer for self-adhering membranes at temperatures above 25 degrees F shall be Aquatac™ Primer manufactured by Henry or equal; a polymer emulsion based adhesive, quick setting. Primer shall have the following physical properties:
   1. Color: Aqua.
   2. Weight: 8.7 lbs/gal.
   3. Solids by weight: 53%.
   4. Water based, no solvent odors, low VOC.
   5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F.

B. Primer for self-adhering membranes at all temperatures shall be Blueskin® Adhesive manufactured by Henry, or equal, a synthetic rubber based adhesive, quick setting, having the following physical properties:
   1. Color: Blue.
   2. Weight: 6 lbs/gal.
   3. Solids by weight: 35%.
   4. Drying time (initial set): 30 minutes.

2.04 PENETRATION & TERMINATION SEALANT

A. Termination Sealant shall be HE925 BES Sealant manufactured by Henry or equal; a moisture cure, medium modulus polymer modified sealing compound having the following physical properties:
   1. Compatible with sheet air barrier, roofing and waterproofing membranes and substrate.
   2. Complies with Fed. Spec. TT-S-00230C, Type II, Class A.
   3. Complies with ASTM C 920, Type S, Grade NS, Class 25.
   4. Elongation: 450 – 550%.
   5. Remains flexible with aging.
   6. Seals construction joints up to 1 inch wide.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Architect in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.
C. All surfaces shall be sound, dry, clean and free of oil, grease, dirt, or other contaminants. Fill voids and gaps in substrate to provide an even plane.
D. Do not proceed with application of air barrier membrane when rain is expected within 24 hours.
E. Condition materials to room temperature prior to application to facilitate handling.

3.02 SURFACE PREPARATION

A. Ensure all preparatory work is complete prior to applying primary air barrier membrane.
B. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
C. Apply primer at rate recommended by manufacturer to all areas to receive self-adhering sheet air/vapor barrier membrane and or through-wall flashing membrane as indicated on drawings by roller or spray and allow minimum 30 minute open time. Primed surfaces not covered by self-adhering membrane or self-adhering through-wall flashing membrane during the same working day shall be re-primed.

3.03 INSTALLTION OF AIR BARRIER SYSTEM

A. JOINT TREATMENT
1. Seal gaps and voids or irregular joints greater than ¼ inch between sheathing panels with a strip of self-adhering air/vapor barrier transition membrane lapped a minimum of 1 1/2 inches on both sides of the joint.
a. Prime surfaces as per manufacturers' instructions and allow to dry.
b. Align and position self-adhering air/vapor barrier transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
c. Roll all laps and membrane with a counter top roller to ensure seal.
2. Alternately, joints not exceeding 1/8 inch can be sealed with yellow open weave glass fabric.
a. Apply yellow open weave glass fabric centered over joint followed by a 1/8 inch (120mils) thick trowel application of air/vapor barrier membrane.
b. Allow to dry prior to application of primary vapor permeable air barrier membrane.

B. INSIDE AND OUTSIDE CORNERS
1. Seal inside and outside corners of sheathing panels with a strip of self-adhering transition membrane extending a minimum of 3 inches on either side of the corner detail.
a. Prime surfaces as per manufacturers' instructions and allow to dry.
b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inches overlap at all end and side laps of membrane.
c. Roll all laps and membrane with a counter top roller to ensure seal.

D. TRANSITON AREAS
1. Tie-in to structural beams, columns, floor slabs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhering air barrier transition membrane.
a. Prime surfaces as per manufacturers' instructions and allow to dry.
b. Align and position self-adhering transition membrane, remove protective

film and press firmly into place. Provide minimum 3 inch lap to all substrates.

c. Ensure minimum 2 inch overlap at all end and side laps of membrane.

d. Roll all laps and membrane with a counter top roller to ensure seal.

E. WINDOWS, DOORS, LOUVERS AND ROUGH OPENINGS

1. Wrap head and jamb of rough openings with specified self-adhering transition membrane as detailed. Place specified sill flashing membrane across sills and end dam terminations.

a. Prime surfaces as per manufacturers' instructions and allow to dry.

b. Align and position self-adhering transition membrane, remove protective film and press firmly into place. Ensure minimum 2 inch overlap at all end and side laps of membrane.

c. Roll all laps and membrane with a counter top roller to ensure seal.

F. THROUGH-WALL FLASHING MEMBRANE

1. Apply through-wall flashing membrane along the base of brick veneer walls and over window, louver, and door openings as detailed.

a. Prime surfaces and allow to dry, press membrane firmly into place, over lap minimum 2 inches at all end and side laps. Promptly roll all laps and membrane to ensure the seal.

b. Applications shall form a continuous flashing membrane and shall extend up a minimum of 8 inches up the insulated concrete form wall.

c. Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.

d. Install through-wall flashing membrane and extend 1/2 inch from outside edge of veneer. Provide "end dam" flashing as detailed.

G. PRIMARY AIR BARRIER

1. Apply by spray or flat trowel a complete and continuous unbroken film of liquid air and rain barrier membrane.

a. For temperatures above 40 degrees F and rising, apply single component water based elastomeric emulsion air barrier membrane at a rate of18.6 sq.ft/gallon to a uniform wet film thickness of 90 mils.

2. Spray apply or trowel around all projections and penetrations ensuring a complete and continuous air barrier membrane. Lap liquid applied membrane 1 inch over self-adhering membranes to seal leading edge.

3. Allow air barrier membrane to dry as per manufacturers recommendations prior to placement of insulating materials.

3.04 APPLICATION OF TERMINATION SEALANT

A. Seal membrane terminations, heads of mechanical fasteners, embedded brick ties, around penetrations, duct work, electrical and other apparatus extending through the primary water resistive air barrier membrane and around the perimeter edge of membrane terminations at window, louver, and door frames with specified termination sealant.

3.05 FIELD QUALITY CONTROL

A. Make notification when sections of the Work are complete to allow review prior to covering air barrier system.

3.06 PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
B. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer.
C. Damp substrates shall not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.
D. Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane. Drying time varies depending on temperature and relative humidity. Protect the air barrier Work against wet weather conditions for a minimum of 24 hours.

END OF SECTION 07272

SECTION 07460 – METAL ROOFING AND WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide preformed metal roofing and wall panels.

1.02 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.04 WARRANTY

A. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal roofing, wall, and soffit panels within the specified warranty period and agreeing to repair finish or replace panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.
   1. Warranty Period: 20 years from date of Substantial Completion.

B. Special Weathertightness Warranty: Submit a written warranty, signed by manufacturer on his standard form, in which manufacture agrees to repair or replace metal roofing, wall, and soffit panels within the specified warranty period that fail to remain weathertight, including leaks.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel roofing panels; Aluminum-Zinc alloy-coated steel sheet ASTM A 792/A 792M, Class AZ50 or AZ55 coating designation, Grade 40; Peterson Aluminum Corporation or approved equal:
   1. Panel: Tite-Loc Plus Panel, 12 inches wide, 2 inches high standing seam.
   2. Surface: Striations with pencil rib stiffening beads.
   3. Thickness: Minimum 24 gage, unless indicated otherwise on drawings.
   4. Finish: Kynar 500 2-coat fluoropolymer.
   5. Color: To be selected by the Architect.

B. Steel wall panels; Aluminum-Zinc alloy-coated steel sheet ASTM A 792/A 792M, Class AZ50 or AZ55 coating designation, Grade 40; Peterson Aluminum Corporation or approved equal:

1. Panel: Flush Wall Panel, 12 inches wide, 1 inch deep.
2. Surface: Smooth with two stiffener beads.
3. Thickness: Minimum 24 gage, unless indicated otherwise on drawings.
4. Finish: Kynar 500 2-coat fluoropolymer.
5. Color: To be selected by the Architect.

C. Perforated Aluminum Wall Panels: Provide perforated aluminum wall panels by Peterson PAC-CLAD or equal.
1. Wall panel: M-36 panel made from .050 inch aluminum sheet
2. Perforated with 1/8 inch diameter round holes set at 7/32 inch spacing for a 30% open area.
3. Finish: Provide wall panels factory prefinished in Manufacturer's premium coating.
4. Color: Provide in color as selected by Architect from Manufacturer's standard stock.
5. Miscellaneous materials: Provide with manufacturer's matching screws, rivets, closure strips, "J" mold and angle trim as necessary for a finished installation. Exposed miscellaneous materials shall be finished to match wall panel finish. Provide manufacturer's touch-up paint as necessary to coat screw and rivet heads.

D. Self-Adhering Sheet Underlayment: High temperature, Butyl or SBS-modified asphalt, slip-resisting polyethylene, surfaced with release paper backing, ASTM D 1970/D 1970M.

E. Accessories: Unless otherwise specified, provide components required for a complete assembly including gutters, downspouts, trim, copings, corner units, ridge closures, clips, seam covers, battens, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of roofing/wall/soffit panels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.

B. Restore damaged components and finishes. Clean and protect work from damage.

END OF SECTION 07460

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide flashing and sheet metal components for building construction.
   1. Gutters and downspouts.
   2. Exposed metal trim units.
   3. Miscellaneous sheet metal accessories.

1.02 PERFORMANCE REQUIREMENTS

A. System Design: Provide flashing and sheet metal components that are identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7-99.
   1. Design wind velocity shall be as indicated on the Structural drawings with a wind load importance factor of 1.00.
   2. Design pressures are indicated on the structural drawings.

1.03 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.
B. Manufacturer Certificates: Signed by roofing manufacturer certifying that flashing and sheet metal components comply with requirements specified in "Performance Requirements" Article.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Downspouts: Minimum .040” formed aluminum with welded seams, support straps and brackets as required. Support straps for downspouts shall go over the downspouts and be anchored to the wall. Make in minimum 10’-0” sections and provide wall straps at a maximum of 10’-0” o.c.
B. Gutters: Formed from minimum 0.040-inch- thick aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
C. Gutter Supports: Fabricated from same material and finish as gutters; spaced 36 inches o.c.
D. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
E. Finish: Kynar 500 2-coat fluoropolymer to match metal roofing and soffit panels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Follow recommendations of SMACNA "Sheet Metal Manual". Allow for expansion. Isolate dissimilar materials to prevent galvanic corrosion.

B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate installation with roofing system and work of other sections to ensure weather tight performance. Anchor securely to structure to withstand inward and outward loads.

C. Restore damaged components and finishes. Clean and protect work from damage.

END OF SECTION 07600

SECTION 07900 - JOINT SEALERS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide sealants at intersection of building components.

1.02 SUBMITTALS

A. Submit for approval samples, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Joints designed for expansion and movement conditions at site:
   1. Exterior joints on vertical surfaces: Non-sag polyurethane; Pecora Dymonic or Tremco Dymeric or approved equal.
   2. Ceramic tile, toilet fixture joints: Silicone rubber; Tremco Proglaze or Dow 786 or approved equal.
   3. Interior joints, joints at mirrors: Acrylic latex; Tremco Acrylic Latex or approved equal.
   4. Seam sealant for small metal to metal joints; Tremco Seam Sealer or approved equal.
   5. Precompressed expanding foam secondary sealant; Emseal Greyflex or approved equal.
   6. Primers, bond breakers, and backer rods compatible with sealant and adjacent surfaces.
   7. Fire-retardant sealant; refer to Division 7 Section “Firestopping.”

PART 3 - EXECUTION

3.01 INSTALLATION

A. Examine substrate; report unsatisfactory conditions in writing. Beginning work means acceptance of substrates.
B. Provide sealants in colors as selected from manufacturer's standards. Sealants shall match adjacent surfaces unless otherwise specified.
C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections. Clean and prime joints, and install bond breakers, backer rods and sealant as recommended by manufacturers.

D. Depth shall equal width up to 1/2" wide; depth shall equal 1/2 width for joints over 1/2" wide, except fill joints completely with fire-retardant products.

E. Cure and protect sealants as directed by manufacturers. Replace or restore damaged sealants. Clean adjacent surfaces to remove spillage.

END OF SECTION 07900

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide steel doors.
B. Provide steel door frames and interior view window frames.
C. All exterior doors and frames shall be hurricane rated with impact glass.

1.02 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.
B. Doors, frames, hardware, and steel frame components shall be as shown on shop drawings and schedules and shall be approved by the Architect before fabricating any material; this supplier shall submit complete shop drawings and schedules to the Architect for approval. Submittals are to include, but not limited to, location, size, swings, anchoring details, materials, vision lites and louvers. Architect may request samples or other additional information.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
B. Test Reports and Labeling Compliance: Where fire-rated door openings are indicated or required, provide fire-rated door and frame assemblies that comply with N.F.P.A. 80-2000 "*Standards for Fire Doors and Windows*", and have been tested in accordance with ASTME 152 "*Standard Methods of Fire Tests of Door Assemblies"*. Testing shall have been at a facility operated by Underwriters Laboratories or Warnock-Hershey. A label showing compliance shall be attached to each frame and door in a location readily visible to inspecting authorities. Note: Fire-rated doors shall be factory prepared for hardware so that it maintains the fire rating.
C. Supplier: To the greatest extent possible, obtain all doors and frames from one manufacturer. Hollow metal supplier shall have in his employ a Certified Door Consultant (CDC) or person of equal experience who will be available at reasonable times to consult with the Architect or Owner regarding the project. The hollow metal supplier shall have been in the business of fabricating hollow metal for a period of not less than ten (10) years and shall maintain an office, a fabrication shop, and a stocking warehouse within a distance of fifty (50) miles of the School District's central office at the JE Hall center, 30 East Texar drive, Pensacola, Fl., - 32503- to properly maintain and service the project after completion

1.04 MANUFACTURERS:

A. Specifications apply to steel doors, steel door frames, steel frame components and architectural stick assemblies such as side-lites, borrowed lites, transom frames and window walls as detailed on architectural plans and schedules. Manufacturer shall be one of the following:
   1. Steelcraft - Cincinnati, Ohio.
   2. Curries - Mason City, Iowa.

3. Ceco Door – Milan, Tennessee

1.05 PACKAGING/STORAGE AND HANDLING:

A. Doors and frames are to be shipped to the jobsite clearly marked in a manner easily correlated to the approved schedules and the architectural plans. Doors are to be provided in manufacturer's original cartons.

B. Store doors and frames at the jobsite in an area protected from the weather. Do not store frames and doors in the open. Lay doors flat on wooden sills minimum of 4" from floor. Provide a ¼" space between doors to promote air circulation. Do not stack other materials on top of doors. Avoid the use of un-vented plastic or canvas coverings that may create humidity chambers. If door wrapper becomes wet, remove carton immediately.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials and Finishes:
1. Doors, frames, and frame components shall be manufactured from hot-dipped galvanized steel, G60 zinc coating conforming to ASTM specification A525.
2. All doors, frames, and frame components shall be cleaned, phosphatized and finished as standard with one coat of baked-on rust inhibiting prime painted in accordance with the ANSI A224.1 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."
3. Doors and frame shall be cleaned, phosphatized and finished with a baked-on rust inhibiting primer in compliance with 200-hour salt spray and 500-hour humidity test in accordance with ASTM test method B117 and D1735.

B. Construction of Doors:
1. Doors shall be full flush fabricated from hot-dipped galvanized steel (see Materials and Finishes section above), 16-gage for 1 3/4" doors. Doors shall be reinforced, stiffened, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels. Doors shall have continuous vertical mechanical interlocking joints at lock and hinge edges with visible edge seams. Doors shall have beveled (1/8" in 2") hinge and lock edges. Top and bottom steel reinforcement channels shall be 14-gage and spot welded within the doors. Hinge reinforcements shall be 8-gage for 1 3/4" doors. Lock reinforcements shall be 16-gage and closer reinforcements shall be 14-gage. Galvanized doors shall have galvanized hardware reinforcements. Adequate reinforcements shall be provided for other hardware as required.
2. Provide thermally improved doors with maximum U-value of 0.24 btu/hr/sq.ft./degree F (ASTM C236) for all exterior doors and elsewhere as noted.
3. Door lite units shall be screw type, not snap in.
4. Door lites shall not be more than half glass.

C. Construction of Frames:
1. Flush Frames: Flush frames shall be formed from 16-gage galvanized steel (see *Materials and Finishes* section "A" above). Frames shall have 2" faces. Masonry frames shall typically have a 4" head with a 7'-0" door opening. Frames shall be set-up and arc-welded. Mitered corners shall have reinforcements with 4 integral tabs for

secure and easy interlocking of jambs to head. Frames shall be supplied with factory-installed rubber bumpers, three (3) per strike jamb and two (2) per head for pair of doors. Frames for 1 3/4" doors shall have 8-gage steel hinge reinforcements, and frames shall be prepared for 4 1/2" x 4 1/2" standard or heavy weight template hinges. Strike reinforcements shall be 16-gage and prepared for an ANSI-A115.1-2 strike. Metal plaster guards shall be provided for all mortised cutouts. Reinforcements for surface closer shall be 14-gage steel. Galvanized frames shall have galvanized hardware reinforcements. Adequate reinforcements shall be provided for other hardware when required. Frames shall be furnished with a minimum of six wall anchors and two base anchors of manufacturer's standard design. Welded frames shall have a spreader bar securely welded to bottom of jambs. Spreader bar is for protection of frames during shipment and shall be removed before installing frames. Do not use this bar as an installation aid.

2. When specified, steel panels shall be 1 ¾" thick and made of same construction and materials as doors.
3. Frames for hurricane rated doors shall be 14-gage with heavy duty hinges.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Before installation begins, hollow metal supplier shall attend a pre-installation conference with the Contractor, Installer and Architect to discuss the installation procedure and clarify any questions about the installation.

B. Door and frames shall be installed in accordance with Door and Hardware Institute publication, "*The Installation of Commercial Doors and Steel Frames"* and manufacturer's instructions.

C. Fill all frames in masonry walls with grout and caulk top and sides for proper sealing. Door frames shall be set in their designated opening before being filled with grout.

D. Thresholds on exterior openings shall be embedded in a bed of sealant.

E. Fabricate work to be rigid, neat and free from seams, defects, dents, warp, buckle, and exposed fasteners. Install doors and frames in compliance with SDI-100, NFPA 80, and requirements of authorities having jurisdiction.

F. Touch-up damaged coatings and leave ready to receive finish painting.

G. When installation is complete, the hollow metal supplier shall visit the jobsite and do a walk-through inspection with the Contractor and Installer. Check frames and doors for proper installation and inform Contractor and Architect of any discrepancies.

END OF SECTION 08110

SECTION 08210 - WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide wood doors.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer’s descriptive literature, specifications, installation instructions, warranty form and other data required to indicate compliance with specified requirements.
B. Shop Drawings:
   1. Submit door schedule indicating opening identifying number, door type, grade, size thickness, swing, label requirements and undercuts.
   2. Include door elevations indicating type of construction conditions at cutouts for vision panels and louvers.
   3. Detail full size molding sections.
   4. Indicate pre-fitting and pre-machining requirements including hardware locations.
   5. Use same reference number for openings and details as Contract Drawings.
C. Samples: Submit minimum 8” x 10” samples showing specified wood veneer and factory finish applied to actual door face material.
D. Certificates: Submit to indicate compliance with specified fabrication and test requirements signed by authorized representative of door manufacturer.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
B. Manufacturer Qualifications:
   1. All products covered under this Section shall be produced by a single manufacturer unless other specified.
   2. Manufacturer shall submit evidence of having not less than ten (10) years successful production of this product.
C. Source Quality Control: AWI Quality Standards of Architectural Woodwork Institute, Section 01300, WDMA I.S.1A-04 Architectural Wood Flush Door Standard.
D. Doors shall be 5-ply and comply with AWI / WDMA construction. Doors shall be manufactured by the hot-press method, bonding faces, crossbands and core together in a single operation with Type I glue. Doors manufactured by cold-pressing 2 or 3-ply pre-manufactured door skins to multiple cores in the same press will not be accepted.
E. To the greatest extent possible, obtain all doors and frames from one manufacturer. Wood Door Supplier shall maintain an office and warehouse within 50 miles from the job site to properly maintain and service the project during and after construction is complete.

1.04 DELIVERY, STORAGE AND HANDLING

A. Protect during transit, storage and handling to prevent damage, soiling and deterioration.
B. Comply with manufacturer's instructions and with "On-Site-Care" requirements of AWI

pamphlet "Care and Finishing of Wood Doors".

C. Deliver components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name and identifying number on covering.

D. Storage:
   1. Store in clean, dry, well ventilated area protected from sunlight.
   2. Avoid extreme heat, cold, dryness or humidity.
   3. The relative humidity in the storage area shall not be less than 10% nor greater than 50%.
   4. Store flat over level surface above floor on wood blocking.
   5. Under bottom door and over top of stack, furnish plywood or corrugated cardboard for protection.

E. Handling: Do not drag doors across one another or across other surfaces.

1.05 WARRANTY

A. Submit written warranty on manufacturer's standard form signed by official of door manufacturer agreeing to repair or replace defective doors which have:
   1. Delaminated in any degree.
   2. Warp or twist of 1/4" or more in plane of door face.
   3. Telegraphing of stile, rail or core through face to cause surface variation in excess of 1/100" in any 1" span.
   4. When hanging doors, do not subject them to extremes of heat and/or humidity conditions. Relative humidity shall not be less than 30% nor more than 50%.

B. Warranty shall also include refinishing and reinstallation which may be required due to repair or replacement of the defective doors.

C. Warranty shall be in effect for life of original installation (interior use).

1.06 ACCEPTABLE MANUFACTURERS

A. A specific product or material manufactured by any of the following listed manufacturers are "acceptable" (not "approved") only if the specific product or material can evidence exact compliance with the Contract Documents.

   1. VT Industries
      1000 Industrial Park
      P.O. Box 490
      Holstein, Iowa 51025
      Phone Toll Free: 800-827-1615 ext 235

   2. Algoma Hardwoods, Inc.
      1001 Perry Street
      Algoma, Wisconsin 54201
      Phone Toll Free: 800-558-0155

   3. Eggers Industries, Architectural Door Division
      164 North Lake Street
      Neenah, Wisconsin 54956
      Phone: 414-722-6444

   4 Marshfield Door Systems
      1401 East Fourth Street
      Marshfield, Wisconsin 54449
      Phone Toll Free: 800-869-3667

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wood doors for transparent finish: Solid core flush wood door for interior use; AWI premium grade.
   1. Solid Core: Architectural Grade of 5-Ply Construction.
   2. Model: AWI Type SCLC-5 (7 Ply not acceptable).
   3. Style: Flush, or as indicated on door schedule.
   4. Face: AWI Custom Grade/WDMA Premium Grade red oak veneer, rift cut, random matched.
   5. Core: Structural composite lumber.
   6. Stile Edges: Matching hardwood stile edges bonded to core, 1 1/8" minimum after trim.
   7. Crossband: Minimum 1/16” High Density Fiberboard (HDF) composite.
   8. Rail Edges: Mill option softwood bonded to core, 1 1/18" minimum after trim.
   9. Adhesive: Exterior or wet/damp interior use, Type I - Interior use, Type II.

B. Wood doors for labeled fire doors: Solid core flush wood door for interior use; AWI premium grade.
   1. Model: AWI Type FD-5 (7 Ply not acceptable).
   2. Style: Flush, or as indicated on door schedule.
   3. Face: AWI Custom Grade/WDMA Premium Grade red oak veneer, rift cut, random matched.
   4. Core: Non-combustible mineral (no asbestos).
   5. Stile Edges: 5/8" after trimming treated hardwood.
   6. Rail Edges: Top, 1/2" minimum treated. Bottom, 1 1/2" minimum treated.
   7. Rating: As indicated on door schedule.

C. Door Lite Units
   1. Provide metal vision frames wrapped with veneer to match door faces.
   2. Door lite units shall not be more than half-glass size.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fabrication:
   1. General:
      a. Comply with AWI Quality Standards Section 1300 except to meet or exceed requirements herein specified.
      b. Completely factory prefit to require size ready for installation at project site, no on-jobsite trimming permitted.
      c. Prepare in accordance with frame shop drawings and schedule, hardware schedule, and templates.
   2. Thickness: 1 3/4" thick unless indicated otherwise on door schedule.
   3. Fabricating Tolerances:
      a. Prefit size + or -1/32" overall dimensions.
      b. Squareness: Length or diagonal measured on face of door from upper left corner to lower right corner with maximum difference of 1/8".

c. Maximum warp 1/4".
d. Show-through (telegraphing): 1/100" deviation from true plane in any 3" span on door face.

B. Preparation:
1. Examine door frames and verify frames are of correct type and have been installed for proper hanging of corresponding doors.

C. Installation:
1. Install in accordance with manufacturer's written instructions.
2. Install fire rated doors in accordance within NFPA 80.
3. Install accurately in frame, within clearances specified. Install hardware in accordance with manufacturer's written instructions and associated templates. Refer to general installations requirements.
4. Do not field cut doors down to opening sizes smaller than those for which doors were manufactured. Do not install doors in frames set out of plumb.
5. Install to operate freely, but not loosely, free from hinge bound conditions, striking or binding. Do not install in frames which would hinder operation of doors. Hang free from rattling when in latched position.

D. Adjusting:
1. Adjust and check each door to ensure proper operating and function.
2. Replace or rehang doors which are hinge bound and do not swing or operate freely. Remove and replace doors which are warped, twisted, or which are not in true planes.
3. Replace doors that have been damaged during installation.

E. Factory Transparent Finish: Finish faces and vertical edges, seal top and bottom edges as required for warranty purposes. Wrap and protect.
1. Grade: Premium.
2. Finish: Manufacturer's standard UV cured polyurethane, equal to WDMA TR-6 catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full range.
4. Sheen: Satin.

END OF SECTION 08210

SECTION 08330 - OVERHEAD ROLLING DOORS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide flexible-curtain type, overhead coiling service doors.
   1. Push-up operating rolling counter doors.

1.02 SUBMITTALS

A. Submit for approval shop drawings, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.04 WARRANTY

A. Manufacturer shall warranty rolling counter fire doors for a period of two (2) years against defects in workmanship and materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Push-up operating rolling counter door: Push-up operated, face of wall mounted, stainless steel curtain, Type ESC10 by Cornell-Cookson, Inc. or approved equal.
   1. Door Curtain: Interconnected, 22 gage, 1-1/4” x 3/8” stainless steel slats.
   2. Bottom Bar: stainless steel angle with lift handles.
   3. Door Guides: 12 gage stainless steel jambs.
   4. Hood: 24 gage stainless steel.
   5. Operation: Manual push up/pull down.
   6. Locking Mechanism: Concealed sliding bolt deadlock in bottom bar operated by pad-lockable thumb-turn.
   7. Stainless Steel: No. 4 polished finish.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
B. Install assemblies complete with all hardware, anchors, inserts, supports and accessories. Test and adjust operation.
C. Restore damaged finishes and test for proper operation. Clean and protect work from

damage.

END OF SECTION 08330

SECTION 08410 - ALUMINUM STOREFRONT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior thermally broken, impact resistant aluminum storefront systems including fixed framing, entrance doors, and project-out operable windows.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

   1. Air infiltration and water penetration exceeding specified limits.
   2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Wind Loads: Provide storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of ASCE 7-98.

   1. Design wind velocity and pressure shall be as indicated on structural drawings with a wind load importance factor of 1.0.
   2. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller, unless otherwise indicated.
   3. Static-Pressure Test Performance: Provide storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

      a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
      b. Duration: As required by design wind velocity; fastest 1 mile (1.609 km) of wind for relevant exposure category.
      c. Design pressures for components and cladding shall be as indicated on structural drawings.

D. Hurricane-Resistance Test Performance: Provide storefront systems that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic-pressure tests according to testing requirements of authorities having jurisdiction.

   1. Storefront systems shall withstand the impact of wind-borne debris missiles in accordance with the impact and cyclic loading criteria per SBC/SSTD 12-99.

E. Dead Loads: Provide storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch (3.18-mm) clearance between members and top of glazing or other fixed part immediately below.

F. Air Infiltration: Provide storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. (0.3 L/s/sq. m) of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75.2 Pa).

G. Water Penetration: Provide storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft. (299 Pa). Water leakage is defined as follows:

1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

H. Thermal Movements: Provide storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

I. Structural-Support Movement: Provide storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

J. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 59 when tested according to AAMA 1503.1.

K. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.45 Btu/sq. ft. x h x deg F (3.57 W/sq. m x K) when tested according to AAMA 507.

L. Dimensional Tolerances: Provide storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

D. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of storefront systems with requirements based on comprehensive testing of current systems.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing storefront systems similar to those required for this Project and who is acceptable to manufacturer.

1. Engineering Responsibility: Prepare data for storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of storefront system through one source from a single manufacturer.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including, but not limited to, excessive deflection.
2. Adhesive sealant failures.
3. Cohesive sealant failures.
4. Failure of system to meet performance requirements.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

D. Warranty Period for Metal Finishes: 10 years from date of Substantial Completion.

E. Warranty Period for Insulating Glass: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for aluminum storefront systems is based on the following products. Subject to compliance with requirements, provide the named product or an equivalent product by one of the manufacturers listed in paragraph 2.1.B below.

1. Fixed Framing: YHS 50TU Thermally Broken, Impact Resistant Storefront System as manufactured by YKK AP America Inc. NOA No. 02-0618.08 (Large Missile Impact) and NOA No. 02-618.09 (Small Missile Impact).
2. Entrance Doors: Model 50H Impact Resistant Heavy Duty Swing Door as manufactured by YKK AP America Inc. with concealed mid-panel panic exit device, see section 08710. NOA No. 02-0221.07 (Large & Small Missile Impact).

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Arch Amarlite.
2. Butler Manufacturing Company; Vistawall Architectural Products.
3. CMI Architectural Products, Inc.
4. Commercial Architectural Products, Inc.
5. EFCO Corporation.
6. International Aluminum Corporation; U.S. Aluminum.
7. Tubelite Architectural Systems.
8. WCI Company; Waltek.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
5. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing as specified in Division 8 Section "Glazing."

C. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

D. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

E. Secondary Sealant: For use as weatherseal, compatible with structural silicone sealant and other system components with which it comes in contact, and that accommodates a 50 percent increase or decrease in joint width at the time of application when measured according to ASTM C 719.

1. Color: As selected by Architect from manufacturer's full range of colors.
2. Use neutral-cure silicone sealant with insulating-glass units.

F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

G. Sealants and joint fillers for joints at perimeter of storefront systems as specified in Division 7 Section "Joint Sealants."

H. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.3 COMPONENTS

A. Doors: Provide manufacturer's standard heavy duty 2-3/8-inch thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded tubular rail and stile members. Fabricate door corners joined by concealed reinforcement secured with screws, and sigma deep penetration welding.

1. Glazing Stops and Gaskets: Provide manufacturer's standard glazing stops with EPDM glazing gaskets.
2. Stile Design: Medium stile; 5-inch nominal width; bottom rail width as indicated in drawings.

B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Reinforce members as required to retain fastener threads.
2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

E. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, complying with ASTM A 666, of type selected by manufacturer for compatibility with system.

2.4 HARDWARE

A. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.

B. Ball-Bearing Butts: ANSI/BHMA A156.1, Grade 1, 5-knuckle, 4-1/2-by-4-inch (101.6-by-114.3-mm) ball-bearing butts. Provide nonremovable pins at hinges exposed to door outside and provide nonferrous hinges for applications exposed to weather. Provide 3 hinges at each leaf for doors up to 36 inches (914 mm) wide and 80 inches (2032 mm) tall; provide 4 hinges at each leaf for taller doors.

C. Closers, General: Comply with manufacturer's recommendations for closer size, depending on door size, exposure to weather, and anticipated frequency of use.

1. Closing Cycle: Comply with requirements of authorities having jurisdiction or the Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," whichever are more stringent.
2. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:

    a. Exterior Doors: 15 lbf (67 N).

D. Surface-Mounted Overhead Power Operators: As specified in Division 8 Section "Finish Hardware."

E. Door Stops: ANSI/BHMA A156.16, Grade 1, floor-mounted door stop with integral rubber bumper.

F. Cylinders: As specified in Division 8 Section "Finish Hardware."

G. Panic Pull Handles: 1” diameter anodized aluminum pull handle.

H. Thresholds: At exterior doors, provide manufacturer's standard ADA compliant threshold with cutouts coordinated for operating hardware, with anchors and jamb clips, and not more than 1/2-inch- (12.7-mm-) high, with beveled edges providing a floor level change with a slope of not more than 1:2, and in the following material:

1. Material: Aluminum, mill finish.

I. Weather Sweeps: Manufacturer's standard weather sweep for application to exterior door bottoms and with concealed fasteners on mounting strips.

2.5 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

F. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

G. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

H. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.

2.6 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class II, Color Anodic Finish: color anodic finish, AAM12G22A44, Bronze. Color to match existing campus. Final color selection by Architect from manufacturer’s standard bronze colors.

EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.

1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.

H. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

I. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.

J. Erection Tolerances: Install storefront systems to comply with the following maximum tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.

2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.3 ADJUSTING AND CLEANING

A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.

B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08410

SECTION 08710 – FINISH HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes items know commercially as Finish Hardware required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and/or frame.
B. Related Work: Hardware supplier shall check with other sections of this specification for related work such as aluminum entrances, metal doors and frames, wood doors, toilet partitions and accessories or any other items that may relate to work in this section.
C. All hardware shall comply with rules of State Requirements for Educational Facilities (SREF), the American National Standard for Building and Facilities (ANSI A117.1), and the Americans with Disabilities Act (Federal Register 28 CFR Part 36, July 26, 1991).
D. Doorknobs or levers to hazardous areas shall be provided with "*tactile*" identifications for the visually impaired.
E. The function of locking devices shall be such as will maintain maximum security from unauthorized or illegal entry during unoccupied hours.

1.02 SUBMITTALS

A. The finish hardware supplier shall, after award of a formal contract, submit to the Architect, four (4) complete typewritten copies of the proposed finish hardware schedule for approval. This schedule shall be prepared using the "*Sequence and Format for the Hardware Schedule*" as approved and recommended by the Door and Hardware Institute (DHI). The Architect shall forward two (2) copies of the finish hardware schedule to the School District's Project Manager in the Facilities Planning Department. The Project Manager shall provide one copy to the Locksmith Department Supervisor. The School District will review the hardware submittal and develop the keying schedule. The keying schedule along with any review comments will be sent to the Architect for submission to the Contractor in combination with the Architect's review and/or approval. After approval of the schedule, the hardware supplier shall provide six (6) copies of this approved schedule to the Architect for file and distribution purposes. The hardware supplier will not order hardware until an approved schedule has been received with including School District review and concurrence.
B. When submitting schedules for approval, include two (2) manufacturers' cut sheets on each hardware item proposed.

1.03 QUALITY ASSURANCE

A. Manufacturers and model numbers listed are to establish a standard of quality. Provide products from one of the listed manufacturers only. No substitutions will be accepted.
B. The Finish Hardware supplier shall furnish to the General Contractor all finishing hardware as hereinafter specified or as obviously required to complete the project. Items not specifically mentioned but necessary to complete the work shall be furnished, matching in quality and finish to the items hereinafter specified or described. Should an opening be omitted, this supplier shall provide finish hardware equal to that specified for similar or adjacent openings and as approved by the Architect for function and quality. No extras will be allowed for omitted but required items. Clarify all questions with the Architect in writing, prior to bid opening.
C. Experience: Hardware shall be furnished by those having experience in the builders

hardware field, competent to correctly interpret the plans, and specifications; to furnish appropriate technician regularly employed by them to immediately service the job as required. This technician shall operate out of a stocking builders hardware warehouse located within fifty (50) miles of the School District's central office at 30 East Texar Drive, Pensacola, Fl. -32503-, in order to ensure immediate servicing of the project. This supplier shall make two scheduled visits to the job site during the application of the finished hardware. Prior to each visit, he shall notify the General Contractor and the Architect in writing of his intention to visit the job so that either or both parties may have representatives on the job to discuss any hardware problems encountered. In addition, this supplier shall immediately service the job upon the call of the General Contractor and/or the Architect. Upon the completion of the job and prior to the final construction inspection, this supplier shall lubricate and adjust all hardware according to the manufacturer's recommendations. These service requirements shall be demanded and strictly enforced by the Architect.

D. Fire Rated Openings: Provide hardware for fire-rated openings in compliance with N.F.P.A. Standards No. 80 and the Florida Department of Education Code requirements. Provide only hardware which has been tested and listed by Underwriters Laboratories, Inc., for types and sizes of doors required and complies with requirements of door and door frame labels.

1.04 DELIVERY, STORAGE AND HANDLING

A. Marking and Packaging: Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's substantial commercial carton or container, properly marked or labeled to be readily identifiable with the permanent approved hardware schedule.

B. Delivery: All items of Finish Hardware shall be received at supplier's warehouse, checked for correctness of product, strikes, brackets, screws and miscellaneous items, etc. Hardware is to be accumulated at supplier's warehouse and as far as practical be delivered in one complete delivery by supplier's own personnel. Contractor shall refuse drop or factory shipments. Supplier is to coordinate delivery with Contractor and Contractor is to check all hardware items at time of delivery with personnel from supplier's office.

C. Inventory: Hardware is to be inventoried jointly with representatives of the hardware supplier and the contractors hardware installer until each is satisfied that the count is correct.

D. Handling: Provide secure lock-up for hardware delivered to the project, but not yet installed. Control the handling and installation of hardware items which are not immediately replaceable so that the completion of the work will not be delayed by hardware losses, both before and after installation.

1.05 WARRANTY

A. Provide manufacturers' written warranties on all items, except overhead closers, against failure due to defective materials and workmanship for a period of one year commencing on the date of Substantial Completion. In the event of such failure, promptly repair or replace with no additional costs to Owner.

B. Provide manufacturer's written warranties on overhead closers against failure due to defective materials and workmanship for a period of five years commencing on the date of Substantial Completion. In the event of such failure, promptly repair or replace the closer at no additional costs to Owner.

1.06 MAINTENANCE

A. Maintenance Service: Supplier shall have in his employment a qualified technician to be called upon to service all of the hardware items supplied.

B. Special Tools: Provide special tools, such as spanner wrenches, dogging keys and etc. required to service and adjust hardware items.

PART 2 - PRODUCTS

2.01 MANUFACTURERS LISTED AND APPROVED EQUALS

A. Hinges/Butts:

Hager	Stanley	McKinney
BB1199	FBB199	T4A3386
BB1168	FBB168	T4A3786
BB1191	FBB191	TA2314
BB1279	FBB179	TA2714

B. Cylindrical Locks and Lever Design:

Falcon	Schlage	Stanley
B Series	AL Series	7KC Series

Falcon	Schlage	Stanley
D	SAT	15D

C. Deadlocks: School House Function

Falcon	Schlage	Stanley
D111	B663	83T7L

D. Panic Devices (Fire Rated if required):

Von Duprin
98NL-32D

Von Duprin
996L Trim - Fire Doors

E. Closers:

LCN	Norton	Sargent
4041	7500	281

F. Automatic Flush Bolts:

Wood Doors:

McKinney	Hager	DCI
FB13W	296W	962

Metal Doors:

Ives	Hager	Rockwood
FB51P	292D	1842

G. Manual Flush Bolts:

Ives	Hager	Rockwood
458	282D	555

H. Push Plates (4" x 16"):

Ives	Hager	Rockwood

8200	30S	70C

I. Pull Plates (4" x 16" x 8" ctc):

Ives	Hager	Rockwood
8302-8	33E	107 x 70C

J. Kick plates (.050" Thickness):

Ives	Hager	Rockwood
8400	190S	050

K. Dome Stops (Machine Screws x Expansion Shield):

Ives	Hager	Rockwood
436/438	241F/243F	441/443

Heavy Duty Door Stops

Ives	Rockwood	Hager
FS185	466	269F
FS18L	467	

L. Wall Bumpers:

Rockwood	Ives	Hager
400	WS401CVX	230W

M. Floor Stop and Holder:

Ives	Hagar	Rockwood
444	267F	471
446	268F	473
443	255W	475
445	256W	477

N. Thresholds:

NGP	Pempko	Hagar
896	2005AV	520SAV

O Weatherstripping:

Hager	Pemko	NGP
726S	S88D	726S

P Door Sweeps:

NGP	Pemko	Hagar
200NA	315CN	750SAN

Q Rain Drip:

NGP	Pemko	Hagar
16AD	346C	810S

R Bollard (for card reader): Provide the basis of design product listed or approved equal:

1. 4” X 4” square X 48” nominal height, 304 stainless steel with 0.12” wall thickness, finish US32D as manufactured by Pedestal Pro, model # ADA-Stainless-Tower-48x4x4. Provided with concealed mounting bracket anchored to concrete substrate. Provide in brushed #4 finish.

2. Custom prepare mounting face for standard single gang electrical box.

2.02 MATERIALS

A. Cylindrical Locks:
   1. Locks on doors not requiring panic devices shall be ANSI 156.2, Series 4000, Grade 2 bored locks with 2 ¾" backset. Functions shall be as indicated in the hardware schedule. All classroom doors located at interior corridors shall have Schlage Allegion CO-100 Standalone Electronic Lock.
   2. Exterior classroom doors (outside walls) shall have rim panic-no dogging function, no outside trim, rim cylinder only.
   3. Student restroom doors in elementary facilities shall be provided with passage latches unless directed otherwise.

B. Panic Devices: Approved
   1. Panic devices on exterior or interior exit doors (non fire rated) shall be rim type with dogging function meeting the following specifications: Type 1, Function 03, Grade 1. Exterior trim shall be cylinder x pull trim. Approved Devices:
      Von Duprin 98 Series 990NL
      NOTE: Panic devices are to be sole sourced as approved by the School Board August 21, 2009 to provide compatibility with the school districts electronic security access system.
   2. Panic devices on fire rated exterior or interior doors shall be rim type meeting the following specifications: Type 1, Function 08, Grade 1 and shall be labeled for use on fire doors. Trim shall be cylinder x lever, Von Duprin 996L, vandal. No dogging is allowed on these doors.
   3. Pairs of doors requiring panic devices (exterior or interior fire rated or non rated) shall be equipped with two (2) rim panics and a key removable mull. Except in the case of specific instances listed elsewhere or where required by code, the use of vertical rod exit devices is allowed on interior fire rated doors or when approved by Locksmith Department.. Trim for pairs of doors is the same as described for single doors above.
   4. Manufacturer's standard dogging feature is required on all exit devices used on non-fire rated doors. Cylinder dogging is not acceptable.

C. Closers:
   1. All door closers shall be mounted with the following:
      a. Parallel arm mounts.
      b. Sex nuts and bolts (for all wood doors and any metal doors not having reinforcement for door closers). Bolt holes shall be located with template and drilled prior to hanging doors.
      c. Backcheck function (adjusted properly).
   2. All door closers shall be mounted for 180 degree opening wherever wall conditions permit.
   3. All closers shall have a written 10-year warranty.
      Approved List:

Exterior Doors	Interior Doors
LCN P4041-EDA	LCN P1461
Norton 7500 – P Rigid Arm	Norton 8301
Sargent 281-P10	Sargent 1431

   4. Electronic hold-opens shall be provided for fire-rated interior doors serving media

centers, equipment storage areas, shipping/receiving areas and fire and smoke-rated interior egress doors.

a. Hold-opens shall comply with SREF regulations and existing building codes and shall interface with fire alarm system to automatically release when the alarm is activated.

D. Stops: All doors shall have floor or wall stops unless otherwise noted.

E. Flush Bolts: Lever extension flush bolts shall be installed at the top and bottom of the inactive leaf of pairs of doors. The bottom bolt shall operate into a dust-proof floor strike or threshold. Bottom bolt shall be approximately 12" off the floor and the top bolt shall be approximately 72" off the floor.

2.03 MANUFACTURER

A. Obtain each type of hardware (Latch and Locksets, Closers, Panic Devices, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

2.04 FINISHES

A. Provide matching finishes for hardware units at each door opening, to the greatest extent possible, and except as otherwise indicated. Reduce difference in color and texture as much as commercially possible where the base metal; or metal forming process is different for individual units of hardware exposed at the same door of opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch sets used) for color and texture.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

C. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI A156.18 "Materials and Finishes Standards", including coordination with the traditional U.S. Finishes shown by certain manufacturers for their products. Finishes shall be as follows:

Butts Exterior	626
Butts Interior	652
Locks	626
Panic or Exit Devices	630
Closers	689
Threshold	Aluminum
Push and Pull and Kick plates	630
All other items of hardware	626

Note: The use of 628 aluminum is only acceptable for thresholds and weather-stripping.

2.05 KEYING

A. All locks shall be equipped with 7-pin Falcon interchangeable cores and keyed to the existing Escambia County School Board System (no substitutions).

B. All cylinders must have black-keyed temporary cores for use as a construction keying system. Temporary cores remain the property of the supplier and must be returned at the time permanent cores are installed.

C. Install all Falcon I.C. mortise (threaded) cylinders with proper Falcon interchangeable core installation tool (Tool #1407).

D. Hardware supplier shall consult the Architect and Locksmith Department of the School District of Escambia County to secure written approval of the complete keying layout prior to placing lock order with factory. The keying schedule will be done by the School District's Locksmith Department. All permanent keys and keying are to be completed by Falcon Lock Company at the factory using "Embossed" Falcon original key blanks. This is to ensure that the integrity and security of the system is maintained.

E. All factory cut keys to be stamped with key symbol only. Provide 1-key per core.

F. The Supplier shall furnish 150 extra Falcon Key Blanks and 10 un-combinated cores of proper keyway on any project requiring 20 or more keyed locks.

G. School Board personnel shall install permanent cores after acceptance of the building by the Owner and return temporary cores to the supplier.

H. All permanent cores and keys shall be identified for the specific project and marked for the correct opening. Cores and keys are to be delivered to:

School District of Escambia County
Maintenance Department, Room 401
Lock Shop
30 East Texar Drive
Pensacola, FL 32503

2.06 FASTENERS

A. Furnish all Finish Hardware with all necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use. **(Other fasteners that are not factory supplied will void manufacturer's warranty and will not be acceptable.)**

B. **Provide sex bolts for all panic or exit devices and door closers in wood doors**. The use of sex bolts does not negate the requirement for proper reinforcement of doors and frames.

C. All fastenings shall harmonize with the hardware in material & finish.

D. The architectural hardware consultant shall verify the use of proper fasteners and hole sizes in installation during site visits as required under "Quality Assurance" of this section.

E. All doors shall be pre-machined for receipt of hardware per door specifications. Pilot holes shall be drilled for lock and hinge mounting screws in wood doors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights indicated in "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames" by Door and Hardware Institute (DHI), except as otherwise specifically indicated or to comply with requirements of governing regulations, requirements for the handicapped or if otherwise directed by the Architect.

B. Install fire rated doors in accordance with N.F.P.A. – 80.

C. All hardware shall be installed by tradesmen skilled in the application of commercial grade hardware.

D. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Securely fasten all parts to be attached. Fit faces of mortised parts snug and flush. Make sure all operating parts move freely and smoothly without binding, sticking or excessive clearance. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, the hardware shall be removed and stored prior to the painting or finishing. Items shall than be reinstalled only when the finishes have been completed on the surface to which is to be applied.

E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

F. At exterior doors and elsewhere as indicated, set thresholds in a bed of sealant as specified in Section 07900 to completely fill concealed voids and exclude moisture from every source. Do not plug drain holes or block weeps. Remove excess sealant.

3.02 ADJUSTING AND CLEANING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if no other recommended). Replace units, which are damaged or cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Final Adjustment: Whenever the hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work site during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.03 PROTECTION

A. Whenever hardware is located in areas where it may be subject to damage during construction by handling, cleaning, etc., (i.e., painting, cleaning of bricks) it shall be protected and/or removed from its location until hazardous condition is terminated.

3.04 HARDWARE SCHEDULE

HARDWARE SET 1 — DR. 802A (ALUM. STOREFRONT)

6 EA.	HVY. WGT. HINGES	BB1199 4.5 x 4.5 NRP	630	HAGER
2 EA.	POWER TRANSFER	EPT2	SP28	VON DUPRIN
1 EA.	EXIT DEVICE	QEL-LD-HH98L-NL x 996L-NL 4'	626	VON DUPRIN
1 EA.	EXIT DEVICE	QEL-LD-HH98EO 4'	626	VON DUPRIN
1 EA.	REMOVABLE MULLION	KR9954 7'3"	SP28	VON DUPRIN
1 EA.	MORTISE CYLINDER	C987-H (REMOVABLE MUL.)	626	FALCON
1 EA.	RIM CYLINDER	C953-H	626	FALCON
2 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	AUTOMATIC OPERATOR	9550 REG	689	LCN

	(INDEPENDENT OPERATION)			
1 EA.	ACTUATOR	8310-853T (4 3/4" SQ HD WIRED)	689	LCN
2 EA.	ACTUATOR MT. BOX	8310-867F		LCN
2 EA.	SAFETY SENSOR (HEADER MOUNTED)	8310-877	689	LCN
2 SETS	SAFETY SENSOR (DOOR MOUNTED)	8310-878	689	LCN
1 EA.	POWER SUPPLY	PS902 x 2RS		VON DUPRIN

WEATHERSTRIPPING AND THRESHOLD PROVIDED BY ALUMINUM DOOR SUPPLIER.
ACCESS CONTROL BADGE READER PROVIDED AND INSTALLED BY ACCESS CONTROL SUBCONTRACTOR ON BOLLARD AS INDICATED IN DRAWINGS.

DOOR OPERATION:
WHEN BADGE IS PRESENTED TO ACCESS CONTROL READER ON BOLLARD SIGNAL IS SENT TO THE ELECTRIC LATCH RETRACTION THEN TO THE OPENER TO INITIATE DOOR OPENING CYCLE.
WHEN PUSHING BUTTON INSIDE SIGNAL IS SENT TO THE ELECTRIC LATCH RETRACTION THEN TO THE OPENER TO INITIATE DOOR OPENING CYCLE. PUSHING THE EXIT DEVICE AND MANUALLY OPENING EITHER DOOR ALWAYS ALLOWS EGRESS.

HARDWARE SET 2 — DRS. 815A, 816A

3 EA.	HVY. WGT. HINGES	BB1199 4.5 x 4.5 NRP	630	HAGER
1 EA.	STOREROOM LOCK	B581HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	4040XP w/PA x TBSRT	689	LCN
1 EA.	FLOOR STOP	FS18L	BLK	IVES
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	THRESHOLD	520SV	ALUM	HAGER
1 EA.	SWEEP	750SN	ALUM	HAGER
1 SET	WEATHERSEAL	726S	CHAR	HAGER
1 SET	RAIN DRIP	810S	DBA	HAGER
1 EA.	LATCH PROTECTOR	BLP-107	US32D	DONJO

HARDWARE SET 3 — DR. 801C

6 EA.	HVY DUTY BUTTS	BB1199 4.5 x 4.5 NRP	630	HAGER
2 EA.	POWER TRANSFER	EPT2	SP28	VON DUPRIN

1 EA.	EXIT DEVICE	QEL-LD-HH98L-NL x 996L-NL 4'	626	VON DUPRIN
1 EA.	EXIT DEVICE	LD-HH98EO 4'	626	VON DUPRIN
1 EA.	REMOVABLE MULLION	KR9954 7'3"	SP28	VON DUPRIN
1 EA.	MORTISE CYLINDER	C987-H (REMOVABLE MUL.)	626	FALCON
1 EA.	RIM CYLINDER	C953-H	626	FALCON
2 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
2 EA.	CLOSER	4040XP w/PA x TBSRT	689	LCN
1 EA.	POWER SUPPLY	PS902 x 2RS		VON DUPRIN
2 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	THRESHOLD	520SV	ALUM	HAGER
2 EA.	SWEEP	750SN	ALUM	HAGER
1 SET	WEATHERSEAL	726S	CHAR	HAGER
1 SET	RAIN DRIP	810S	DBA	HAGER
1 EA.	LATCH PROTECTOR	BLP-107	US32D	DONJO

ACCESS CONTROL BADGE READER PROVIDED AND INSTALLED BY ACCESS CONTROL SUBCONTRACTOR.

DOOR OPERATION:
WHEN BADGE IS PRESENTED TO ACCESS CONTROL READER SIGNAL IS SENT TO THE ELECTRIC LATCH RETRACTION IN THE RHR DOOR.
PUSHING THE EXIT DEVICE AND MANUALLY OPENING EITHER DOOR ALWAYS ALLOWS EGRESS.

HARDWARE SET 4 DR. 801D

2 EA.	BUTTS	BB1199 4.5 x 4.5 NRP	630	HAGER
1 EA.	STOREROOM LOCK	B581HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	4040XP Rw/PA x TB	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	THRESHOLD	520SV	ALUM	HAGER
1 EA.	SWEEP	750SN	ALUM	HAGER
1 EA.	WEATHERSEAL	726S	CHAR	HAGER
1 SET	RAIN DRIP	810S	DBA	HAGER
1 EA.	LATCH PROTECTOR	BLP-107	US32D	DONJO

HARDWARE SET 5 DRS. 801A, 801B

6 EA.	BUTTS	BB1168 4.5 x 4.5	652	HAGER
2 EA.	ELEC. POWER TRANSFER	EPT-2	626	VON DUPRIN
1 EA.	EXIT DEVICE	QEL-98L-NL x 996L-NL 06 4'	626	VON DUPRIN

1 EA.	EXIT DEVICE	QEL-98EO x 4'	626	VON DUPRIN
1 EA.	REMOVABLE MULLION	KR9954 7'3"	SP28	VON DUPRIN
1 EA.	RIM CYLINDER	C953-H	626	FALCON
1 EA.	MORTISE CYLINDER	C987-H (REMOVABLE MUL.)	626	FALCON
2 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	AUTOMATIC OPERATOR	9550 (PULL SIDE)	689	LCN
2 EA.	ACTUATOR	8310-853T (4 3/4" SQUARE)	689	LCN
2 EA.	ACTUATOR BOX	8310-867F		LCN
1 EA.	SAFETY SENSOR (HEADER MOUNTED)	8310-877	689	LCN
1 SET	SAFETY SENSOR (PR) (DOOR MOUNTED)	8310-879	689	LCN
2 EA.	KICK PLATES	8400 10" x 1" LDW B4E CS	630	IVES
2 EA.	SILENCERS	SR64	GREY	STEELCRAFT

THE POWER WILL NEED TO BE ELIMINATED TO THE OPENERS TO SECURE THE DOORS AT NIGHT OR IF THERE IS AN INTRUDER IN THE FACILITY SO THAT THE ACTUATORS WILL NOT OPERATE. WE SUGGEST THE ELECTRICIAN TO INSTALL A SWITCH IN THE ROOM FOR CONVENIENCE FOR THE FACILITY OPERATOR.

DOOR OPERATION:
PUSHING THE INSIDE OR OUTSIDE ACTUATOR FIRST INITIATES THE ELECTRIC LATCH RETRACTION SECOND SENDS SIGNAL TO OPENER TO CYCLE AND DOOR OPENS AUTOMATICALLY OR PUSHING THE EXIT DEVICE AND MANUALLY OPENING THE DOOR ALWAYS ALLOWS EGRESS.

HARDWARE SET 6 DRS. 803A, 807A

6 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	STOREROOM LOCK	B581HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	1461 Rw/PA x TB (ACTIVE DR. 803A ONLY)		LCN
2 EA.	SURFACE BOLTS	SB453 8" x SNB	626	IVES
2 EA.	KICK PLATES	8400 10" x 1" LDW B4E CS	630	IVES
2 EA.	SILENCERS	SR64	GREY	STEELCRAFT

HARDWARE SET 7 DR. 804A

3 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	STOREROOM LOCK	B581HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES

1 EA.	PERIMETER SEAL	726S	CHAR	HAGER

HARDWARE SET 8 DR. 805A

3 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	PUSH BUTTON PRIVACY	CO-100-CY-40-KP-RHO	626	SCHLAGE
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	MOP PLATE	8400 4" x 1" LDW B4E CS	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT

HARDWARE SET 9 DRS. 808A, 809A

3 EA.	BUTTS	BB1168 4.5 x 4.5	652	HAGER
1 EA.	PUSH BUTTON LOCK	CO-100-CY-70-KP-RHO-BD	626	SCHLAGE
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN

HARDWARE SET 10 DRS. 812A, 813A

3 EA.	BUTTS	BB1168 4.5 x 4.5	652	HAGER
1 EA.	PUSH PLATE	8200 4" x 16"	630	IVES
1 EA.	PULL PLATE	8302 8" 4" x 16"	630	IVES
1 EA.	AUTOMATIC OPERATOR	9530 (PULL SIDE MT.)	689	LCN
2 EA.	ACTUATOR	8310-853T (4 3/4" SQUARE)	689	LCN
2 EA.	ACTUATOR BOX	8310-867F		LCN
1 EA.	SAFETY SENSOR (HEADER MOUNTED)	8310-877	689	LCN
1 EA.	SAFETY SENSOR (DOOR MOUNTED)	8310-878	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW B4E CS	630	IVES
1 EA.	MOP PLATE	8400 4" x 1" LDW B4E CS	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT

DOOR OPERATION:
PUSHING ACTUATOR OPENS DOOR.

HARDWARE SET 11 DR. 814A

3 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	ENTRY LOCK	B501HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	MOP PLATE	8400 4" x 1" LDW	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT

HARDWARE SET 12 DR. 817A

3 EA.	HVY. WGT. HINGES	BB1199 4.5 x 4.5 NRP	630	HAGER
1 EA.	POWER TRANSFER	EPT2	SP28	VON DUPRIN
1 EA.	EXIT DEVICE	QEL-LD-HH98L-NL x 996L-NL 4'	630	VON DUPRIN
1 EA.	RIM CYLINDER	C953-H	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	AUTOMATIC OPERATOR	9540 SGL. DR.	689	LCN
1 EA.	ACTUATOR	8310-853T (4 3/4" SQ HD WIRED)	689	LCN
1 EA.	ACTUATOR MT. BOX	8310-867F		LCN
1 EA.	SAFETY SENSOR (HEADER MOUNTED)	8310-877	689	LCN
1 SETS	SAFETY SENSOR (DOOR MOUNTED)	8310-878	689	LCN
1 EA.	POWER SUPPLY	PS902 x 2RS		VON DUPRIN
1 EA.	KICK PLATE	8400 10" x 1" LDW	630	IVES
1 EA.	THRESHOLD	520SV	ALUM.	HAGER
1 EA.	SWEEP	750SN	ALUM.	HAGER
1 SET	WEATHERSEAL	726S	CHAR	HAGER
1 SET	RAIN DRIP	810S	DBA	HAGER
1 EA.	LATCH PROTECTOR	BLP-107	US32D	DONJO

ACCESS CONTROL BADGE READER PROVIDED AND INSTALLED BY ACCESS CONTROL SUBCONTRACTOR.

DOOR OPERATION:
WHEN BADGE IS PRESENTED TO ACCESS CONTROL READER OUTSIDE OR PUSH BUTTON DEPRESSED INSIDE SIGNAL IS SENT TO THE ELECTRIC LATCH RETRACTION THEN TO THE OPENER TO INITIATE CYCLE FOR ACCESS OR EGRESS. PUSHING THE EXIT DEVICE AND MANUALLY OPENING THE DOOR ALWAYS ALLOWS EGRESS.

HARDWARE SET 13 DR. 820A

6 EA.	BUTTS	BB1168 4.5 x 4.5	652	HAGER
1 EA.	ENTRY LOCK	B501HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
2 EA.	SURFACE BOLTS	SB360 12" x SNB	626	IVES
2 EA.	KICK PLATE	8400 10" x 1" LDW	630	IVES
2 EA.	SILENCERS	SR64	GREY	STEELCRAFT
2 EA.	OVERHEAD STOP	90S x SNB	630	GJ
2 EA.	PERIMETER SEAL	726S	CHAR	HAGER

HARDWARE SET 14 DR. 821A

3 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	PASSAGE SET	B101 DANE	626	FALCON
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT

HARDWARE SET 15 DR. 806A

3 EA.	BUTTS	BB1279 4.5 x 4.5	652	HAGER
1 EA.	STOREROOM LOCK	B581HD DANE	626	FALCON
1 EA.	PERMANENT CORE	C607 x GMK x RESTRICTED KEYWAY	626	FALCON
1 EA.	CLOSER	1461 Rw/PA x TBSRT	689	LCN
1 EA.	KICK PLATE	8400 10" x 2" LDW	630	IVES
1 EA.	MOP PLATE	8400 4" x 1" LDW	630	IVES
3 EA.	SILENCERS	SR64	GREY	STEELCRAFT

PROVIDE 15 TOTAL FLOOR STOPS, FS18L, BLACK, IVES. ARCHITECT SHALL SELECT LOCATIONS.
PROVIDE 15 TOTAL WALL BUMPERS, WS407CCV, 630, IVES. ARCHITECT SHALL SELECT LOCATIONS.

END OF SECTION 08710

SECTION 08750 – ACCESS CONTROL SYSTEM (ACS) DOORS AND HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Complete Access Control System (ACS) with all operating and access control hardware, required for special applications at specific doors as indicated on the Drawings.
2. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating door Access Control System. Any material and/or equipment necessary for the proper operation of the access control system not specified or described herein shall be deemed part of this specification.
3. Coordinate installation with doors, door frames, and door hardware specified in Sections 08110, 08210, and 08710. All doors that are monitored or provided with access control devices shall be provided with mechanical panic hardware that has the ability to be manually locked in the event of failure by the Access Control System.
4. System Description:
   a. The system shall allow for access to the facility by use of proximity card readers at door locations indicated on the Drawings.
   b. The system shall allow for monitoring of doors indicated on the Drawings.
   c. The system shall provide for computer based configuration so as to allow the greatest control of access both during configuration and ongoing operation.
   d. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, proximity card readers, sensors, etc.
   e. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures of the facility. The system shall control the flow of authorized personnel traffic through the secured areas of the facility.
   f. The user interface at the host computer (server) and at the operator workstation terminal computers shall be existing to remain.
   g. ACS shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel to provide opening of door when card reader is utilized.
   h. Installed ACS must be capable of interconnection to the owner provided dedicated Ethernet LAN/WAN network for connection to remote building Main and/or Terminal Controllers.
5. ACS components include, but are not limited to:
   a. Exit devices and trim.
   b. Electrically activated locksets.
   c. Electric strikes.
   d. Proximity card readers.
   e. Control panels.
   f. Panel interface boards.

g. Power transfer and/or electric hinges
h. Wiring and cabling.
i. Key switches.
j. Electronic access.
k. Miscellaneous material required for complete installation and programming.

6. Scope of work for the Access Control System Contractor shall include, but not be limited to:
a. Electrically activated exit devices, locksets, and strikes.
b. Local control panels.
c. Proximity card readers.
d. Termination of all field wiring including the card readers.
e. Testing and programming of local system.
f. Interface with ADA door operators where applicable.

7. KeyID cards shall be furnished and programmed by the ECSD Protection Services.

B. Related Sections:
1. Section 08110 - Steel Doors and Frames.
2. Section 08210- Wood Doors.
3. Section 08710 - Finish Hardware.

1.02 REFERENCES

A. American National Standards for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People ANSI A117.1 and Uniform Federal Accessibility Standards.

B. Fire-Rated Openings:
1. National Fire Protection Association (NFPA) Standard No. 80. This requirement takes precedence over other requirements for such hardware.
2. Underwriters Laboratory (UL).
3. Warnock Hersey International (WHI).

C. Emergency Exit Devices:
1. Fire-Rated Doors: Provide UL or WHI label on exit devices indicating "Fire Exit Hardware".

D. Wiring:
1. Perform all wiring and electrical work in accordance with NFPA No. 70, "National Electric Code".
2. Control circuits shall be low-voltage Class 2 type only.
3. Contact ECSD Protection Services for standard ACS wiring diagrams prior to submittals.

1.03 SUBMITTALS

A. Manufacturer's technical product data of each item of hardware.
1. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Operation & Maintenance Manuals.
2. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, and sequence of system operation.
3. Submittals shall include testing and commissioning procedures for the specified system, including report forms that will be provided in a final commissioning report.

4. Provide final commission report.

B. Shop Drawings:
   1. Submit shop drawings customized to this installation showing system design, layout and wiring diagrams.

C. Hardware Schedule:
   1. Organize hardware schedule into "hardware sets" indicating complete designations of every item.
   2. Coordinate with other hardware requirements of Section 08710.

D. Templates:
   1. Hardware templates to fabricators of other work which is to receive electromechanical hardware.

E. Record Drawings:
   1. Submit complete as-built PDF drawings identifying each component, system operation, and wiring system.

F. Charts:
   1. Port charts for all new and modified construction.

G. Wiring Diagram:
   1. Factory authorized wiring diagram for all electrified hardware.

1.04 QUALITY ASSURANCE

A. Supplier Qualifications:
   1. Recognized hardware and security system supplier with warehousing facilities.
   2. Hardware supplier shall operate out of a stocking builders hardware warehouse located within seventy-five (75) miles of the School District's Maintenance Department located at 30 East Texar Drive, Pensacola, Florida, 32503.
   3. Employ an experienced hardware consultant with electronic hardware experience, available for consultation during the course of the work.
   4. Factory authorized and certified for installation of Allegion security door hardware.
   5. Factory authorized and certified for installation of S2 Security Corporation products. Submit copy of certification with bid proposal.

B. ECSD Protection Services shall be notified three (3) weeks prior to planned installation of device(s) that will require data communication.

C. All equipment and materials provided shall be new and unused and of the most current model or revision. All components of this system shall be installed in a workmanlike manner, following access control system industry "best practices" and in strict adherence to the manufacturer's specifications and applicable codes.

D. All access control hardware and software shall be of a single manufacturer including controller panels, and input and output terminal modules.

E. All published specifications of the system manufacturer shall be considered as being a part of this specification, even though they have not been written in complete detail.

F. The complete installation shall conform to the requirements set forth by the National Electrical Code, applicable State and Local Building Codes as required by the "Authority Having Jurisdiction" and the requirements of the Owner.

G. The system shall be listed by Underwriters Laboratories for UL 294 Access Control Systems and shall carry the UL labels as required.

H. The Access Control System Contractor shall be responsible for all costs associated with the installation of this equipment.

1.05 WARRANTY

A. The Contractor shall guarantee this system in its entirety to be free from mechanical and electrical defects for a period of one (1) year from the date of Substantial Completion.
B. Warranty shall cover failure on parts of all electro-mechanical hardware for two (2) years.
C. The Contractor's guarantee shall cover all costs associated with the troubleshooting, repair, and replacement of defective work, including costs of labor, transportation, lodging, materials, and equipment.
D. The Equipment Supplier shall make available to the Owner a maintenance contract proposal.

1.06 MAINTENANCE

A. Operation and Maintenance Manuals:
1. Submit operation and maintenance manuals identifying operating procedures and normal maintenance required for each type of hardware required. Include a complete parts list.

PART 2 - PRODUCTS

2.01 PANELS

A. Manufacturers:
1. S2 Security Corporation
a. S2 Expansion Node
b. S2 ACM Board

2.02 PROXIMITY CARD READERS

A. Manufacturers:
1. HID Global Corporation
a. HID – Thinline II 5395 Reader
b. HID – MiniProx 5365 Reader
2. Rosslare Security Products, Inc.
a. goPROX – AYC-M60 Backlit Pin/Proximity Reader
b. goPROX – AYC-G60 Backlit Pin/Proximity Reader

2.03 KEY SWITCHES

A. Manufacturers:
1. Securitron Magnalock Corporation
a. Securitron MKA Mortise Keyswitch

2.04 ELECTRONIC ACCESS

A. Manufacturers:
   1. The Escambia County School District Protection Services Division utilizes an existing S2 Security Management System that operates with District-issued employee KeyID cards. All ACS hardware shall be integrated with this existing system. The School District standard system is the S2 Security Corporation Enterprise Ultra built on S2 NetBox IP-based technology. Only factory certified dealers are authorized to purchase and install equipment. ECSD Protection Services is the Security Consultant for campus access control systems.
   2. Contact ECSD Protection Services for specific wiring diagrams for competitive bidding.

2.05 ELECTRIC STRIKES

A. Manufacturers: Various
   1. Hanchett Entry Systems HES 1006 Series
   2. Hanchett Entry Systems HES 9500 Series
   3. Schlage ES-6400 Series

2.06 ELECTRIFIED LEVER SETS

A. Von Duprin E996

2.07 POWER SUPPLIES

A. Manufacturers: Various
   1. Von Duprin PS914-2RS x 2BB
   2. Altronix Maxim 33 with PD4

2.08 ELECTRICAL POWER TRANSFER

A. Manufacturer: Various
   1. Von Duprin EPT-10
   2. Securitron Door Loop

2.09 ELECTRICAL MATERIALS

A. Conduits and boxes shall be concealed and flush mounted. Interconnecting conduit and necessary pullboxes shall be run throughout the building in accordance with the NEC.
B. Conduits shall be 3/4" trade size, minimum, unless otherwise noted on the Drawings or within these Specifications. Where sizes are not shown, conduits shall be as required to accommodate the number and type of conductors in accordance with the National Electrical Code wiring tables, but shall not be smaller than 3/4". Provide 1” conduit from each secure door main junction box to the serving access control system panel.

2.10 WIRING AND CABLING

A. Each access control/secure door location shall receive a cable containing all necessary cables to operate the access control system. Each cable shall be contained under one jacket. Each cable shall be homerun to the serving access control system panel, shall be continuous from end to end and shall not be spliced under any circumstances.
B. Each access control cable shall contain as a minimum the following cables within its construction: (1) 4-conductor/18awg, (1) 3-pair/ 22awg, (1) 2-conductor/ 22awg and (1) 4-conductor/22awg.
C. All access control cables shall be run continuously in conduit and shall not be free-routed.
D. Conduits, sleeves, J-hooks or cable trays used for Division 17 communications structured cabling system (SCS), including horizontal Category 6, horizontal fiber optic, and horizontal ITV cabling shall not be used for access control system cabling specified under this Section 08750.

2.11 FINISHES

A. Match the finish of the locksets specified in Section 08710.
B. Coordinate all the various manufactured items furnished on this work to ensure an acceptable uniform finish.
C. All exposed access control system conduit shall be painted and accepted by ECSD Protection Services.

PART 3 - EXECUTION

3.01 General Provisions

A. All low voltage control, data, and other cables shall be terminated using terminal strips, with crimp type lugs, no “b style crimp connectors” or wire nuts will be allowed.
B. Electrical Contractor shall provide all raceway systems required for complete rough-in.
C. All readers shall be configured with the reader electronics mounted separately, on the “secure” side of the door such that only the reader head is mounted in the reader housing on the “entry” side of the door.
D. The equipment mounting heights shall be as noted on the Drawings. Mounting heights shall be in accordance with Americans with Disability Act (ADA).

3.02 ACCESS CONTROL SYSTEM PRODUCT DESIGN AND IMPLEMENTATION

A. Contact ECSD Protection Services for access control system consultation.
B. All programming shall be done by ECSD Protection Services or approved Access Control System Contractor.
C. The existing application software in the host computer shall be reprogrammed to accommodate the local subsystem installed under this Contract.

3.03 START-UP, DEMONSTRATION, AND INSPECTION

A. Perform full system check-out and any required adjustments such that system meets Owner's operating requirements and any Code requirements.

B. Demonstrate system operation to Owner's personnel. Instruct Owner's personnel in proper operation and maintenance of each item.

C. Provide three (3) complete printed operation and maintenance manuals in a format as provided by technology system equipment manufacturer.

D. Provide port chart so that ECSD Protection Services can program all related items.

E. Full inspection must be done by ECSD Protection Services before acceptance by Owner.

3.04 COMMISSIONING

A. After ACS Work is complete, and prior to requesting the commissioning report, hereafter known as the Acceptance Test, Contractor shall conduct a final inspection, and pre-test all equipment and system features required for project. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.

B. Contractor shall submit a request for the Acceptance Test in writing to the Owner’s Project Manager, no less than fourteen days prior to the requested test date. The request for Acceptance Test shall be accompanied by a certification from Contractor that all work is complete and has been pre-tested, and that all corrections have been made.

C. During Acceptance Test, Contractor shall demonstrate all equipment and system features to ECSD Protection Services. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested.

D. Any portions of the work found to be deficient or not in compliance with the Drawings and Specifications will be rejected. ECSD Protection Services will prepare a list of any such deficiencies observed during the Acceptance Test. Contractor shall promptly correct all deficiencies and submit a request in writing to Owner’s Project Manager for a follow-up Acceptance Test.

END OF SECTION 08750

SECTION 08800 - GLASS AND GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Provide glass and glazing for all applications, including without limitation, entrances and storefront, windows, glazed doors, transoms, and sidelights.

B. Glass Schedule:

1. Exterior Windows: 1-5/16” thick insulating unit; tinted ¼” tempered exterior pane, clear laminated impact-resistant interior unit, spandrel where indicated, tempered where indicated or required.
2. Exterior Doors: 9/16” laminated impact-resistant.
3. Interior View Windows: 5/16” clear laminated.
4. Interior Doors: 5/16” clear laminated.
5. Rated Interior View windows and Doors: 5/16” fire-rated laminated ceramic.

1.02 SUBMITTALS

A. Submit for approval samples, product data, warranty, and test reports.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Glazing sheets:

1. Primary glass, Fed. Spec DD-G-451:
   a. Clear and tinted float glass.
   b. Wire glass.
2. Heat treated glass products, Fed. Spec DD-G-1403:
   a. Heat-strengthened glass.
   b. Tempered glass.
   c. Spandrel glass.
3. Impact-resistant Glass – Provide at all exterior doors and windows.

B. Insulating glass units: Sealed insulating units fabricated from two panes of glass with air space between, dual sealing system, spacer, desiccant, and corner reinforcement. Glass thicknesses and heat strengthening to be determined by manufacturer for wind loading conditions. Insulating glass warranty: 10 years.

1. Glass tint and color to be selected by Architect from manufacturer’s full range.

C. Glazing materials:

1. Acrylic glazing sealant; Tremco Mono or approved equal.

2. Preformed glazing tape; Tremco Polyshim Tape or approved equal.
3. Glazing gaskets:
    a. Lock-strip gaskets; D. S. Brown Co or approved equal.
    b. Preformed gaskets; Tremco or approved equal.
4. Setting blocks, shims and spacers as required.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Inspect framing and report unsatisfactory conditions in writing.
B. Comply with FGMA "Glazing Manual" and manufacturers instructions and recommendations. Use manufacturer's recommended spacers, blocks, primers, sealers, gaskets and accessories.
C. Install glass with uniformity of pattern, draw, bow and roller marks.
D. Install sealants to provide complete wetting and bond and to create a substantial wash away from glass.
E. Remove and replace damaged glass and glazing. Wash, polish and protect all glass supplied under this section.

END OF SECTION 08800

SECTION 09111 - NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:

1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections include the following:

1. Division 5 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.
2. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

a. Type: Postinstalled, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: 1-1/2 inches (38 mm).

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges, 3/4 inch (19.1 mm) deep.
2. Steel Studs: ASTM C 645.

a. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).
b. Depth: 3-5/8 inches (92.1 mm).

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.

a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm**)**.

4. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical.

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; 640-C Drywall Furring System.
c. USG Corporation; Drywall Suspension System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.

1. Minimum Base-Metal Thickness: As indicated on Drawings.
2. Depth: As indicated on Drawings.

B. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).

C. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: 1-1/2 inches (38.1 mm).
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.

D. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
2. Depth: 7/8 inch (22.2 mm).

E. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical.

F. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: 3/4 inch (19.1 mm).

2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch (0.79 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

G. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare-metal thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

1. Space studs as follows:

a. Single-Layer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
b. Multilayer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
c. Tile backing panels: 16 inches (406 mm) o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb, unless otherwise indicated.
b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

2. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
5. Curved Partitions:

a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.

b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.

D. Direct Furring:

1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 09111

SECTION 09250 – GYPSUM DRYWALL

PART 1 - GENERAL

1.01 SUMMARY

A. Provide gypsum board and support framing systems for walls and ceilings.

1.02 SUBMITTALS

A. Submit for approval product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum board: ASTM C 36, 5/8" thick normal and fire-resistant Type X as indicated or required, U.S. Gypsum Company or approved equal.

B. Abuse-resistant gypsum fiber panel: ASTM C 588, 5/8" thick, Fiberock Brand VHI (Very High Impact) Abuse-Resistant Gypsum Fiber Panel at rated and non-rated partitions, U.S. Gypsum Company or approved equal

C. Steel studs: ASTM C 645, 20 gage screw-type steel studs, 16 inches o.c. maximum, ASTM A 653 G40, hot-dip galvanized.

D. Deep-leg deflection track: ASTM C 645, 20 gage galvanized steel top runner with 2-inch deep flanges.

E. Grid suspension system for ceilings: ASTM C 635, hot-dipped galvanized, heavy-duty direct-hung system composed of main beams and cross-furring members that interlock, U.S. Gypsum Company or approved equal

F. Joint reinforcement: ASTM C 587, paper tape and ready-mixed vinyl compound.

G. Accessories: ASTM C 1047, galvanized steel, Sheetrock Dur-A-Bead corner beads, No. 200 series metal trim, No. 093 zinc control joints, U.S. Gypsum or approved equal.

H. Acoustical sealant: U.S. Gypsum Acoustical Sealant or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with ASTM C754, ASTM C844, ASTM C843 and manufacturer's instructions and recommendations. Maintain environmental conditions within the limits prescribed by manufacturer.

1. Do not allow gypsum base to fade from exposure to light.
2. Erection Tolerance: No more than 1/16-inch offsets between planes of gypsum base faces, and 1/8 inch in 8 feet for level, plumb, warp, and bow.

B. Space framing 16" O.C., unless indicated otherwise. Terminate walls at least 6" above ceilings except for sound or fire-rated partitions which terminate at underside of deck.

C. Install supplementary framing, blocking, and bracing to support fixtures, equipment services, heavy trim, furnishings, or similar construction.

D. Isolate partition framing and wall furring where they abut structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assemblies and laterally support assemblies. Use deep-leg deflection track where indicated. Seal joints between edges and abutting structural surfaces with acoustical sealant.

E. Frame door openings to comply with GA-600, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install two studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

F. Provide sound attenuation blankets within assemblies where indicated.

G. Grid suspension system: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track

H. On partitions/walls, apply gypsum base panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

I. Provide metal trim wherever edge of base would be exposed and at locations recommended by manufacturer.

END OF SECTION 09250

SECTION 09300 - TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Provide ceramic tile work.

1.02 SUBMITTALS

A. Submit for approval samples, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Ceramic field and accent wall tile, in sizes and patterns shown on drawings; Natural Hues, Eco-Body Ceramic by Dal-Tile Corporation Price Group 2, or approved equal.
D. Trim: Matching field tile color, size, texture in available shapes and sizes.
E. Thresholds: Group A marble, ASTM C 503.
F. Setting Methods:
    1. Ceramic tile walls:
        a. Thin set latex-portland cement mortar (TCA Method W202).
    2. Grout:
        a. Porcelain tile: Latex portland cement, ANSI A118.6, colors: custom to match tile and as selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
C. Lay tile in grid pattern with alignment of walls and trim grids. Layout to provide uniform joint widths and to minimize cutting; do not use less than 1/2 tile units.
D. Provide sealant joints where recommended by TCA and approved by Architect.
E. Grout and cure, clean and protect.

END OF SECTION 09300

SECTION 09510 – ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide acoustical ceilings and metal suspension system.
   1. Acoustical panel ceilings, exposed suspension, complete with moldings and trim.

1.02 SUBMITTALS

A. Submit for approval samples, product data, extra stock.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
B. Obtain both acoustical ceiling panels and suspension system from the same manufacturer.

1.04 WARRANTY

A. Manufacturer shall warrant all components of the acoustical ceiling system against failure associated with humidity including sagging, warping, and rusting for a minimum period of thirty (30) years.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Acoustical panels:
   1. Panels (APC1): 3/4" thick, wet-formed, fine fissured mineral fiber; white vinyl latex paint; Armstrong "Fine Fissured" No. 1713 with HumiGuard Plus and BioBlock paint or approved equal.
      a) Panel size: 24" by 24".
      b) Panel edge: Square edge; flush mount with grid.
      c) Application: Typical use. Refer to drawings for scheduled locations.
   2. Panels (APC2): 1/2" thick, gypsum-core panel, 2-mil white, stipple-textured vinyl laminate finish; National Gypsum "Gridstone Gypsum Ceiling Panel" or approved equal.
      a) Panel size: 24" by 24".
      b) Panel edge: Square edge; flush mount with grid.
      c) Application: Damp areas such as kitchens, toilet rooms, custodial closets, locker rooms, science labs. Refer to drawings for scheduled locations.

B. Exposed grid suspension system: Hot dipped galvanized, intermediate duty painted steel, 15/16" T-Grid, White.

1. At Panels APC1: Prefinished steel capping, Armstrong "Prelude XL" or approved equal.
2. At Panels APC2: Prefinished aluminum capping, Armstrong "Prelude Plus XL" or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Measure and layout to avoid less than 1/2 panel units.
B. Install suspension by following manufacturer's instructions and recommendations and ASTM C636.
C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Coordinate with work of other sections.
D. Adjust, clean, and touch-up all system components.
E. Provide wrapped and labeled maintenance stock of new material equal to two percent (2%) of ceiling panels and suspension installed.

END OF SECTION 09510

SECTION 09624 – RESILIENT ATHLETIC SURFACING – INDOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient Athletic Floor for glue-down installation.

B. Related Sections:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with floorings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each sport floor court pattern indicated in the Drawings. Include paint line layouts for courts, color and texture patterns within court layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture and cutouts.

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor covering indicated.

D. Samples for Verification: In manufacturer's standard size, but not less than 12-by-12-inch (305-by-305-mm) sections of each different color and pattern of floor covering required.

E. Product Schedule: For athletic flooring. Use same designations indicated on Drawings.

F. Qualification Data: For qualified Installer.

G. Maintenance Data: For each type of athletic flooring to include maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation, seaming method indicated and playing court paint striping indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 84 and ASTM E 684 by a qualified testing agency.

1. Critical Radiant Flux Classification (ASTM E 684): Class I, not less than 0.45 W/sq. cm.
2. Flame-spread and Smoke-developed ratings (ASTM E 84): Flame-spread: 25 or less; Smoke-developed: 450 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package in protective covering for storage. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Package in protective covering for storage.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive floor coverings during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Install floor coverings after other finishing operations, including painting, have been completed.

E. Protect flooring after installation until Final Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Athletic Sports Flooring: Furnish quantity of 2% extra material for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 RESILIENT ATHLETIC FLOORING FOR GLUE-DOWN INSTALLATION

A. RSF-1: Resilient Athletic Sports Flooring: Basis of Design: Subject to compliance with requirements, provide *Tarkett, Johnsonite* TRN-R TRAINING or approved equal. Provide where indicated on Drawings.

1. Color and Pattern: Selected by Architect from manufacturer's full range
2. Patterns: Uni, Beech and Mapel
3. Pattern Types: Allover, Wood
4. Product Format Type: Roll
5. ASTM Product Type: Sheet Vinyl Floor Covering with Backing (ASTM F1303)
6. Surface Treatment: Polyurethane - reinforced
7. Total Thickness: 0.195 inch (5 mm) (ASTM F386)
8. Wear Layer Thickness: 28 mil (0.7 mm) (ASTM F410)
9. Installation: Glue-down
10. Residual Indentation: 6 mil (0.15 mm) (ASTM F1914)
11. Recycled Content: 22% (Pre-consumer)
12. Product Performance Data:
    a. Sheet material meeting ASTM F1303, Type I, Grade 1, Class C performance sheet vinyl floorcovering with backing
    b. Static coefficient of friction meeting ASTM D 2047 > 0.6
    c. Static load limit meeting ASTM F970 – 175 psi
    d. Fire Performance: Flooring radiant panel meeting ASTM E648 – Class 1
13. Warranty for Resilient Athletic Sports Flooring: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flooring installation that fail in materials or workmanship within the specified warranty period:
    a. Warranty does not include deterioration or failure of flooring due to unusual traffic, failure of substrate, vandalism or abuse.
    b. Failures include, but are not limited to, color fading or uneven change in appearance, delamination, and buckling.
    c. Warranty Period: Five (5) years from date of Substantial Completion.

2.2 ATHLETIC STIPING PAINT

A. Athletic Striping Paint for marking playing courts: provide applied paint striping using Endura Game Line Paint manufactured by *CANAM COATINGS* or equal.
1. Colors: provide in manufacturer's full range as selected by Architect
2. Patterns: Basketball Court - install per officially sanctioned court layout per high school basketball game rules and as indicated on Drawings; Volleyball court – install per layout indicated on drawings.
3. Paint shall be compatible with athletic sports flooring providing adequate adhesion for the purpose intended.

4. Paint shall be durable under the normal wear expected from athletic activities.
5. Warranty for Athletic Striping Paint: manufacturer’s standard.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, blended hydraulic-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Use *Johnsonite* #975, two-part polyurethane adhesive, or equal.

C. Resilient Transition Edge Strips: Resilient material transitions compatible with athletic sports flooring, adjacent flooring and adhesives used for the installation of each; in widths and heights required to transition between finished installed athletic sports flooring and installed adjacent flooring materials; and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of the Work. Examine carpet for type, color, pattern and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient floorings.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits to the extent required by the flooring manufacturer’s written requirements and recommendations.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Concrete subfloor shall be inspected by the resilient athletic sports flooring installer prior to acceptance for installation.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with flooring manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by flooring manufacturer.

D. Adhesive Installation Requirements:

1. Apply per manufacturer's written recommendations.
2. Site condition must be maintained at room temperature for a minimum of 48 hours prior to, during and after installation. Room temperature must be maintained between 65-to-85 degrees F (18-to-30 degrees C) with HVAC system operating. Ambient relative humidity must be maintained between 40%-to-60%.
3. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).
4. Floors must be smooth, flat, and permanently dry.
5. Floors must be clean and free of all foreign material such as dust, paint, grease, oils, solvents, curing/hardening compounds, sealers, asphalt and old adhesive residue.
6. Moisture: It is essential that moisture tests be taken on all concrete sub-floors regardless of age and grade level. Perform three tests for the first 1,000 sq.ft. Then one test should be conducted for every 1,000 sq.ft. of flooring. Test Results should not exceed 7 lbs. per 1,000 sq.ft. in 24 hours when tested in accordance with ASTM F 1869 Standard Test method for Measuring Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride. Alternatively, a relative humidity test not exceeding 85% when performed in accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ probes.
7. Surface Alkalinity: Concrete sub-floor surface pH must be between 7-to-9.
8. Correct all discrepancies before proceeding with installation.

E. Broom and vacuum clean substrates to be covered immediately before installing sports flooring.

3.3 INSTALLATION

A. Comply with resilient athletic sports flooring manufacturer's written installation instructions for the following:

1. Direct-Glue-Down Installation

B. Do not bridge building expansion joints with flooring.

C. Cut and fit sports flooring to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

D. Extend sports flooring into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

F. Install pattern parallel to walls and borders to comply with sports flooring manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient athletic sports floor:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by sports floor manufacturer.
2. Clean sports floor using commercial products recommended by sports floor manufacturer.

B. Protect installed athletic sports flooring.

C. Protect flooring against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer and adhesive manufacturer.

END OF SECTION 09624

SECTION 09652 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vinyl sheet floor covering, with and without backing.

B. Related Sections:
1. Division 9 Section "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor covering indicated.

D. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each different color and pattern of floor covering required.

E. Product Schedule: For floor coverings. Use same designations indicated on Drawings.

F. Qualification Data: For qualified Installer.

G. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store rolls upright.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive floor coverings during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 48 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Covering: Furnish quantity not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 VINYL PLANK FLOOR COVERING

A. LVT-1: Subject to compliance with requirements, provide Interface Level Set, 22 mil, 25cm X 100cm (9 13/16” X 39 3/8”) resilient plank flooring or approved equal.

2.2 VINYL COMPOSITION FLOORING

A. SDVCTG-1: Subject to compliance with requirements, provide Armstrong Static Dissipative Vinyl Composition Tile, 12”x12” tile or approved equal.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by floor covering manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Use adhesives that have a VOC content of not more than60 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing. Concrete sub-floor surface pH must be within tolerances recommended by manufacturer but not less than 7 or greater than 9.
4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing. Perform three tests for the first 1,000 sq.ft. Then one test should be conducted for every 1,000 sq.ft. of flooring. Test Results must show a moisture content no more than that recommended by the manufacturer and should not exceed 7 lbs. per 1,000 sq.ft. in 24 hours when tested in accordance with ASTM F 1869 Standard Test method for Measuring Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride. Alternatively, a relative humidity test not exceeding 85% when performed in accordance with ASTM F 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ probes.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor coverings until they are same temperature as space where they are to be installed.

1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 FLOOR COVERING INSTALLATION

A. Comply with manufacturer's written instructions for installing floor coverings.

B. Unroll floor coverings and allow them to stabilize before cutting and fitting.

C. Lay out floor coverings as follows:

1. Maintain uniformity of floor covering direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
3. Match edges of floor coverings for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.

E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.

H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.

B. Perform the following operations immediately after completing floor covering installation:

1. Remove adhesive and other blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.

C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor coverings until Substantial Completion.

END OF SECTION 09652

SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

B. Related Sections:

1. Division 9 Sections for resilient floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of product indicated.

C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE (RB)

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
b. Flexco, Inc.
c. Johnsonite.
d. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TV (vinyl, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous) or Group II (layered).
3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.

F. Outside Corners: Preformed.

G. Inside Corners: Job formed.

H. Colors and Patterns: As indicated.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
b. Flexco, Inc.
c. Johnsonite.
d. Roppe Corporation, USA.

B. Description: Cap for carpet base, Reducer strip for resilient floor covering, Joiner for tile and carpet Transition strips.

C. Material: Rubber.

D. Profile and Dimensions:

E. Tile/Carpet Transition: Roppe No. 61, rubber.

F. Reducer Strip – 1/8” to 0.080”: Roppe No. 59, rubber.

G. Glue-Down Carpet Edge, 5/16”: Roppe No. 39, rubber.

H. Glue-Down Carpet Edge, 9/32”: Roppe No. 40, rubber.

I. Reducer Strip – 1/8” Butting Gauge (seamless flooring to vinyl composition tile): Roppe No. 45, rubber.

J. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

a. Cove Base Adhesives: Not more than 50 g/L.
b. Rubber Floor Adhesives: Not more than 60 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.

1. Apply two coat(s).

E. Cover resilient products until Substantial Completion.

END OF SECTION 09653

SECTION 09670 – EPOXY FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resinous flooring system as shown on the drawings and in schedules.

B. Related Sections:

1. Division 3 Section “Cast-in-Place Concrete” for sub-floor slabs.

1.3 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with decorative quartz aggregate broadcast and Epoxy broadcast and topcoats.

B. The system shall have the color and texture as specified by the Architect with a nominal thickness of 1/4 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

C. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, provide latest edition of Manufacturer’s literature including performance data and installation instructions.

B. Manufacturer’s Material Safety Data Sheet (MSDS) for each product being used.

C. Samples for Initial Selection: For each type of floor covering indicated.

D. Samples for Verification: In manufacturer's standard size, but not less than 6-by-6-inch (152-by-152-mm) samples of each different color and pattern of floor covering required to represent overall appearance of finished system subject to normal tolerances.

E. Qualification Data: For qualified Installer.

F. Maintenance Data: For each type of epoxy flooring used to include maintenance manuals.

1.5 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. No requests for substitutions shall be considered that would change the generic type of the specified System.

D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.

E. System shall be in compliance with the Indoor Air Quality requirements of California section 01350 as verified by a qualified independent testing laboratory.

F. A pre-installation conference shall be held between Applicator, General Contractor and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

G. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 84 and ASTM E 684 by a qualified testing agency.

1. Critical Radiant Flux Classification (ASTM E 684): Class I, not less than 0.45 W/sq. cm.
2. Flame-spread and Smoke-developed ratings (ASTM E 84): Flame-spread: 25 or less; Smoke-developed: 450 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection:

1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.

C. Waste Disposal:

1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.7 PROJECT CONDITIONS

A. Site Requirements:

1. Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
3. The Applicator shall ensure that adequate ventilation is available for the work area. This shall include the use of manufacturer's approved fans, smooth bore tubing and closure of the work area.
4. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Conditions of new concrete to be coated with cementitious urethane material:

1. Concrete shall be moisture cured for a minimum of 3 days and have fully cured a minimum of 5 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
3. Sealers and curing agents should not to be used.
4. Concrete shall have minimum design strength of 3.500 psi. and a maximum water/cement ratio of 0.45.
5. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements:
1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
2. "No Smoking" signs shall be posted at the entrances to the work area.
3. The Owner shall be responsible for the removal of foodstuffs from the work area.
4. Non-related personnel in the work area shall be kept to a minimum.

D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

E. Close spaces to traffic during floor covering installation.

F. Install floor coverings after other finishing operations, including painting, have been completed.

G. Protect flooring after installation until Final Completion.

1.8 WARRANTY

A. Warrant that material shipped to buyers at the time of shipment are substantially free from material defects and will perform substantially to Manufacturer's published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Warranty amount:

1. Liability with respect to this warranty is strictly limited to the value of the material purchase.

PART 2 - PRODUCTS

2.1 FLOORING

A. Provide Basis-of-Design product or equal that meets the requirements listed.

B. Basis-of-Design: Dur-A-Flex, Inc, Hybri-Flex EQ (self-leveling broadcast quartz), epoxy/aliphatic urethane topcoat seamless flooring system.

1. System Materials:
   a. Topping: Dur-A-Flex, Inc, Poly-Crete MD resin, hardener and SL aggregate.
   b. The broadcast aggregate shall be Dur-A-Flex, Inc. Q28 or Q11 quartz aggregate.
   c. Broadcast: Dur-A-Flex, Inc. Dur-A-Glaze #4, epoxy based two-component resin.
   d. Grout coat: Dur-A-Flex, Inc Dur-A-Glaze #4, epoxy-based, two-component resin.
   e. Top coat: Dur-A-Flex, Inc. Armor Top aliphatic urethane two-component resin.

2. Patch Materials:
   a. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Poly-Crete MD (up to ¼ inch).
   b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Poly-Crete WR.

2.2 MANUFACTURER

A. In accordance with requirements, provide epoxy floor system by Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108, Phone: (860) 528-9838, Fax: (860) 528-2802, or approved equal.

B. Manufacturer of Approved System shall be single source and made in the USA.

2.3 PRODUCT REQUIREMENTS

A. Topping: Poly-Crete SL

1.	Percent Reactive	100 %
2.	VOC	0 g/L
3.	Bond Strength to Concrete ASTM D 4541	400 psi, substrates fails

4.	Compressive Strength, ASTM C 579	9,000 psi
5.	Tensile Strength, ASTM D 638	2,175 psi
6.	Flexural Strength, ASTM D 790	5,076 psi
7.	Impact Resistance @ 125 mils, MIL D-3134,	160 inch-lbs
8.	No visible damage or deterioration	

B. Broadcast Coat: Dur-A-Glaze #4 Resin

1.	Percent Reactive,	100 %
2.	VOC	<4 g/L
3.	Water Absorption, ASTM D 570	0.04%
4.	Tensile Strength, ASTM D 638	4000psi
5.	Coefficient of thermal expansion, ASTM D 696	2 x 10-5 in/in/F
6.	Flammability, ASTM D-635	Self-Extinguishing
7.	Flame Spread, NFPA 101, ASTM E-84	Class A

C. Topcoat: Armor Top

1.	VOC	0 g/L		
2.	60 Degree Gloss, ASTM D523	75+/-5		
3.	Mixed Viscosity, (Brookfield 25oC)	500 cps		
4.	Tensile strength, ASTM D 638	7,000 psi		
5.	Abrasion Resistance, ASTM D4060	Gloss	Satin	
	CS 17 wheel (1,000 g load) 1,000 cycles	4	8	mg loss with grit
		10	12	mg loss without grit
6.	Pot life @ 70o F 50% RH	2 hours		
7.	Full Chemical resistance	7 days		

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of the Work.

1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.2 PREPARATION

A. General:

1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
2. Moisture Testing: Perform tests recommended by manufacturer and as follows:

a. Perform anhydrous calcium chloride test ASTM F 1869-98. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.
b. Perform relative humidity test using is situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99% relative humidity level measurement.
c. If the vapor drive exceeds 99% relative humidity or 20 lbs/1,000 sf/24 hrs then the Owner and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.

3. Mechanical surface preparations:
   a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
   b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   d. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer’s recommendations.

4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.3 APPLICATION

A. General:

1. The system shall be applied in five distinct steps as listed below:
   a. Substrate preparation
   b. Topping/overlay application with quartz aggregate broadcast.
   c. Resin application with quartz aggregate broadcast.
   d. Topcoat application
   e. Second topcoat application

2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.

5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Topping:

1. The topping shall be applied as a self-leveling system as specified by the Architect. The topping shall be applied in one lift with a nominal thickness of 1/8 inch.
2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.
3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. SL Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
4. The topping shall be applied over horizontal surfaces using ½ inch "v" notched squeegee, trowels or other systems approved by the Manufacturer.
5. Immediately upon placing, the topping shall be degassed with a loop roller.
6. Quartz aggregate shall be broadcast to excess into the wet material at the rate of 0.8 lbs/sf.
7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

C. Broadcast:

1. The broadcast coat resin shall be applied at the rate of 90 sf/gal (Q28) or 50 sf/gal (Q11).
2. The broadcast coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume and shall be thoroughly blended by mechanical means such as a high speed paddle mixer.
3. Quartz aggregate shall be broadcast into the wet resin at the rate of 0.5 lbs/sf.
4. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.

D. Grout coat:

1. The grout coat shall be squeegee applied with a coverage rate of 90 sf/gal (Q28) or 50 sf/gal (Q11).
2. The grout coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume and shall be thoroughly blended by mechanical means such as a high speed paddle mixer.
3. The grout coat will be back rolled and cross rolled to provide a uniform texture and finish.

E. Topcoat:

1. The topcoat shall be roller applier with a coverage rate of 500 sf/gal.
2. The finished floor will have a nominal thickness of 1/4 inch.

3.4 FIELD QUALITY CONTROL

A. Tests, Inspection:

1. The following tests shall be conducted by the Applicator:
   a. Temperature:
      1) Air, substrate temperatures and, if applicable, dew point.
   b. Coverage Rates:

1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.5 CLEANING AND PROTECTING

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION 09670

SECTION 09680 - CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Carpet tile for glue-down installation.

B. Related Sections:

1. Division 9 Section "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with carpet flooring.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of carpet. Include carpet layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.

C. Samples for Initial Selection: For each type of floor covering indicated.

D. Samples for Verification: In manufacturer's standard size, but not less than 12-by-12-inch (305-by-305-mm) sections of each different color and pattern of floor covering required.

E. Product Schedule: For carpet tiles. Use same designations indicated on Drawings.

F. Qualification Data: For qualified Installer.

G. Maintenance Data: For each type of carpet to include maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 84 and ASTM E 684 by a qualified testing agency.

1. Critical Radiant Flux Classification (ASTM E 684): Class I, not less than 0.45 W/sq. cm.

2. Flame-spread and Smoke-developed ratings (ASTM E 84): Flame-spread: 25 or less; Smoke-developed: 450 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package in protective covering for storage. Store carpet and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Package in protective covering for storage.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive floor coverings during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor covering installation.

D. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet tile: Furnish quantity not less than 1 extra tile for every 50 or fraction thereof for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 CARPET TILE FOR GLUE-DOWN INSTALLATION

A. CPT-1: Walk-Off Carpet Tile: Basis of Design: Subject to compliance with requirements, provide *Interface* Step Repeat Tile or approved equal. Provide at entries and where indicated on drawings.

1. Backing System: GlasBac Tile or equal
2. Color: Selected by Architect from manufacturer's full range
3. Product Construction: Tufted Textured Loop
4. Yarn System: Aquafil Type 6,6 Nylon; mill extruded nylons will not be accepted
5. Dye Method: 100% solution dye
6. Soil/Stain Protection: *Proteck* with *Duratech* or equal; Soil/Stain Protection cannot be a topical treatment
7. Antimicrobial Treatment: (AATCC 138 Washed) (AATCC 174 Parts 2 and 3) *Intersept* or equal; Antimicrobial Treatment cannot be a topical treatment
8. Product Specifications:
   a. Tufted Yarn Weight: 28 oz/sq.yd.
   b. Pile Density: 6720
   c. Size: 24-by-24-inch (610-by-610-cm)
9. Installation: Glue-down
10. Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within the specified warranty period:
    a. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism or abuse.
    b. Failures include, but are not limited to, more than 10% loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge and delamination.
    c. Warranty Period: Fifteen (15) years from date of Substantial Completion.

2.2 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, blended hydraulic-cement-based formulation provided or approved by carpet manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of the Work. Examine carpet for type, color, pattern and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:

1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."

B. Do not bridge building expansion joints with carpet.

C. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

D. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

F. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

END OF SECTION 09680

SECTION 09900 – PAINTING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide painting and surface preparation for all unfinished interior and exterior surfaces, including electrical and mechanical equipment.

1.02 SUBMITTALS

A. Submit for approval samples, product data, mock-ups, extra stock.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. First-line standard products for all systems by Benjamin-Moore, Coronado, Devoe, Glidden, PPG, Pratt and Lambert, Sherwin-Williams, Tnemec, or approved equal.

B. Exterior paint systems:
   1. Concrete masonry units: 100% acrylic block filler, 100% acrylic enamel (semi-gloss), 2 coats.
   2. Ferrous metal: Rust inhibitive metal primer, 100% acrylic enamel (high-gloss), 2 coats.
   3. Galvanized metal: Galvanized metal primer, 100% acrylic enamel (high-gloss), 2 coats.

C. Interior paint systems:
   1. Veneer plaster: Acrylic latex primer, acrylic latex enamel (eggshell), 2 coats.
   2. Concrete masonry units: 100% acrylic block filler, acrylic latex enamel (semi-gloss), 2 coats.
   3. Concrete masonry units (heavy duty): epoxy block filler, 2-component epoxy enamel (high-gloss), 2 coats.
   4. Wood for natural transparent finish: Sanding sealer, waterborne clear-satin varnish, 2 coats.
   5. Ferrous metal: Rust inhibitive metal primer, 100% acrylic enamel (high-gloss), 2 coats.
   6. Galvanized metal: Galvanized metal primer, 100% acrylic enamel (high-gloss), 2 coats.

D. Mildewcide additive:
   1. Provide mildewcide additive to all exterior paint. Mildewcide additive shall be chemically compatible with paint formulation and shall not adversely affect the color, texture, or durability of the coating.
   2. Mildewcide additive shall be EPA registered, non-toxic, low VOC composition, and shall provide complete protection against microbial defacement of painted

surfaces.

3. Provide M-1 Advanced Mildewcide as manufactured by The Jomaps Company or approved equal.

2.02 ENVIRONMENTAL CRITERIA

A. VOC Content of Paints:

1. The volatile organic compound (VOC) content of interior paints, interior primers, and anti-corrosive paints used in interior applications shall not exceed the limits defined in the Green Seal Environmental Standards for Paints (GS-11, dated 5/20/93) and Anti-Corrosive Paints (GC-03, dated 1/7/97), of Green Seal, Washington, DC. The VOC limits defined in the referenced Green Seal standards are as follows. All VOC limits are defined in grams per liter, and exclude water and tinting color added at the point of sale (as determined by U.S. EPA Reference Test Method 24).
   a. Flats: 50 g/L.
   b. Non-Flats: 150 g/L.
   c. Anticorrosive Gloss, Semi-Gloss, & Flat: 250 g/L.
   d. Clear Varnish: 350 g/L.
   e. Clear Lacquer: 550 g/L.
   f. Floor Coatings: 100 g/L.
   g. Waterproofing Sealers: 250 g/L.
   h. Sanding Sealers: 275 g/L.
   i. Other Sealers: 200 g/L.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Inspect surfaces, report unsatisfactory conditions in writing; beginning work means acceptance of substrate.

B. Comply with manufacturer's instructions and recommendations for preparation, priming and coating work. Coordinate with work of other sections.

C. Match approved mock-ups for color, texture, pattern and coverage. Re-coat or remove and replace work which does not match.

D. Clean up, touch up and protect work.

END OF SECTION 09900

SECTION 09960 – HIGH PERFORMANCE COATING FOR EXTERIOR STEEL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:

1. Exterior Substrates: Steel and steel surfaces noted to receive “high performance coating” or “special coating.”

B. Related Requirements:

1. Section 05120 “Structural Steel Framing” for shop priming of metal substrates with primers specified in this Section.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated:

1. Submit Samples on aluminum Q-panel backing, 3” x 6”.
2. Step coats on Samples to show each coat required for system.
3. Label each Sample for location and application area.

1.03 MAINENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective coverings for storage and identified with labels describing contents.

1. Coatings: 2 gallons of each product.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient atmospheric conditions and temperature continuously maintained within the acceptable parameters outlined by the manufacturer’s product literature.
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.05 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are within the acceptable parameters outlined by the manufacturer's product literature.

B. Do not apply coatings when relative humidity exceeds the allowable level as stated in the manufacturer's product literature; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog or mist

1.06 COATING SYSTEM WARRANTY REQUIREMENTS

A. Coating systems shall be installed as required to qualify for manufacturer's standard fifteen (15) year warranty against corrosion, crack, check, peel, color shift, loss of gloss and chalking. Special warranty provisions by manufacturer's which have no existing warranties of the type required in effect at the time of bidding shall not be considered acceptable to satisfy the intent of the specification. Warranted product's documented commercial availability in the marketplace shall not be a shorter duration than the specified warranty term.

B. Warranty coverage shall be expressed in the following terms:
   1. Fade (Color Change): DE Hunter units per ASTM D 2244.
   2. Gloss: Units as measured by a gloss meter referencing ASTM D 523-89 with 60 degree geometry.
   3. Chalk: Rating as per ASTM D 4214, Method A.

1.07 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for a minimum of the duration of the specified warranty coverage. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Basis of Design;
   1. Tnemec Company, Inc. 6800 Corporate Drive, Kansas City, MO 64120

B. Product Distribution and Technical Representation:
   1. SteelCon Coating Systems, Inc., Attention: Buddy Stanford; phone: (850) 807-4004; email: (bstanford@tnemec.com)

2.02 HIGH PERFORMANCE COATING, GENERAL

A. Performance Standards: provide products of equal or better performance characteristics to the basis of design products as listed in this Section.

B. Colors: As selected by Architect from manufacturer's full range.

2.03 METAL PRIMERS

A. Primer, Zinc Rich Moisture Cured Urethane, Organic:

1. Tnemec Series 90G-1K97 Tnemec-Zinc
2. Formulation Description; Single component, Zinc Rich Moisture Cured Urethane
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
    a. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541(Method E, Type V Tester)/ASTM D 3359 (Method B, 5mm Crosshatch)
    b. Flexibility & Elongation: ASTM D 522- Average of Three Tests
    c. Humidity: ASTM D 4585- 15,000 Hours
    d. Immersion: ASTM D 870 (Tap Water) – two Years/ASTM D 870 (Deionized Water @ 140 deg. F) – 2,000 Hours
    e. Impact: ASTM D 2794- Average of Three Tests
    f. Prohesion: ASTM G 85- 10,000 Hours
    g. Salt Spray (Fog): ASTM B 117 – 50,000 Hours

2.04 EPOXY INTERMEDIATE COAT

A. Intermediate Coat, Epoxy, Polyamide:

1. Tnemec Series 66 Hi-Build Epoxoline
2. Formulation Description: Polyamide Epoxy
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
    a. Abrasion: ASTM D 4060 (CS-17 Wheel, 1,000 gram load) – 1,000 Cycles
    b. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541 (Method E, Type V Tester)
    c. Hardness: ASTM D 3363 (Pencil) – gouge
    d. Humidity: ASTM D 4585 – 4,500 hours
    e. Immersion: ASTM D 870 (Tap Water) – Four Years
    f. Prohesion: ASTM G 85 – 5,000 Hours
    g. Salt Spray (Fog): ASTM B 117- 10,900 Hours

2.05 FLUOROPOLYMER FINISH COAT

A. Finish Coat, Advanced Thermoset Solution Fluoropolymer:

1. Tnemec Series 1070 (or 1071/1072) Fluoronar
2. Formulation Description: Advanced Thermoset Solution Flurorpolymer
3. Performance Criteria for Evaluation of "Or Equal" Submittals:
    a. Abrasion: ASTM D 4060 (CS-17 Wheel, 1,000 gram load) – 1,000 Cycles

b. Adhesion: ASTM D 4541 (Method B, Type II Tester)/ASTM D 4541 (Method E, Type V Tester)
c. Carbon Arc Weathering: ASTM G 153 – 5,500 Hours
d. Cleanability: MIL-PRF-85285D Section 4.6.13- Average of Two Tests
e. Exterior Exposure: ASTM D 1014 (AAMA 2604-98)/ASTM D 4141 (Method C, EMMAQUA)
f. Flexibility & Elongation: ASTM D 522 (Method A, Conical Mandrel) – Average of Three Tests
g. Hardness: ASTM D 3363 (Pencil) – gouge
h. Humidity: ASTM D 4585 – 3,000 Hours
i. Impact: ASTM D 2794 – Average of Three Tests
j. QUV Exposure: ASTM D 4587 (UVA 340 Bulbs, Cycle 4: 8 Hours UV/4 Hour Condensation) – 25,000 Hours
k. Salt Spray (Fog): ASTM B 117 – 10,000 Hours
l. Xenon Arc Weathering: ASTM D 6695 – 8,000 Hours

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Beginning coating application constitutes Contractor’s acceptance of substrates and conditions.

3.02 PREPARATION

A. Comply with manufacturer’s written instructions and recommendations applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulates.
1. Remove incompatible primers and reprime substrate with compatible primers and apply tie coat ass required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and disbanded or incompatible shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. SSPC-PA 6/NACE No. 3, “Commercial Blast Cleaning”

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.03 APPLICATION

A. Apply high-performance coatings according to manufacturer’s written instructions and recommendations:

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer’s written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer’s written recommendations.

3.05 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.06 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. OZR MCU/Epoxy/Fluoropolymer System:

1. Shop Applied prime Coat: Primer, zinc-rich, Organic
    a. Surface Preparation: Abrasive blast referencing SSPC-SP 6; 1.0 mil angular surface profile
    b. Primer: Tnemec Series 90G-1K97 Tnemec-Zinc applied at 2.5 to 3.5 mils DFT
2. Field Touchup of Shop Applied Primer:
    a. Surface Preparation: Power Tool Clean To Bare Metal referencing SSPC-SP 11
    b. Primer: Tnemec Series 90G-1K97 Tnemec-Zinc applied at 2.5 to 3.5 mils DFT
3. Stripe Coat: Epoxy, Polyamide
    a. Tnemec Series 66 Hi-Build Epoxoline applied at 4.0 to 6.0 mils DFT at all corners, protrusions, and sharp edges
4. Intermediate Coat: Epoxy, Polyamide
    a. Tnemec Series 66 Hi-Build Epoxoline applied at 4.0 to 6.0 mils DFT
5. Topcoat: Advanced Thermoset Solution Fluoropolymer, Gloss/Semi-Gloss/Satin
    a. Tnemec Series 1070 (or 1071 or 1072) Fluoronar applied at 2.0 to 3.0 mils DFT

END OF SECTION 09960

SECTION 10155 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes toilet compartments and screens as follows:
   1. Type: Solid-plastic, polymer resin.
   2. Compartment Style: Overhead braced and floor anchored.
   3. Screen Style: Floor and wall anchored.

1.02 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Initial Selection: Manufacturer's color charts consisting of sections of actual units showing the full range of colors, textures, and patterns available for each type of compartment or screen indicated.

1.03 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Compression Polymers Group; Comtec Industries.
   2. Partition Systems, Inc.; Columbia Partitions.
   3. Rockville Partitions, Inc.
   4. Santana Products, Inc.

2.02 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Solid-Plastic, Polymer Resin: High-density polyethylene (HDPE) with homogenous color throughout. Provide material not less than 1 inch (25 mm) thick with seamless construction and eased edges in color and pattern as follows:
   1. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range of Designer series colors and patterns with lightly speckled finish.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:
   1. Material: Stainless steel.

E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
   1. Material: Stainless steel.

F. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile in manufacturer's standard finish.
   1. Provide vertical supports without horizontal bridging and bracing to structure overhead where indicated to maintain a clear path through doorways full height to ceiling above.

G. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip in manufacturer's standard finish.

H. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.03 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
   1. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Solid-Plastic, Polymer-Resin Compartments and Screens: Provide aluminum heat-sink strips at exposed bottom edges of HDPE units to prevent burning.

C. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

D. Floor-Anchored, Full-Height Urinal Screens: Provide pilasters and panels of same construction, finish, and height as toilet compartments. Provide manufacturer's standard stainless steel anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

E. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide out-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.
   1. Hinges: Manufacturer's standard self-closing full-length continuous stainless steel piano hinge.
   2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access.

Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.

3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible. Provide additional pull on inside of door at hinge side within accessible compartments.

2.04 STAINLESS-STEEL SHEET FINISHES

A. General: Comply with NAAM's "Metal finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
   1. Remove or blend tool and die marks and stretch lines into finish.
   2. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Finish: Manufacturer's standard #3 or #4 directional polish.

C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

D. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
   1. Secure panels to walls and panels with continuous full-height stirrup brackets. Locate wall anchors to occur in masonry or tile joints.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

3.02 ADJUSTING AND CLEANING

A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.

B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 10155

SECTION 10200 - LOUVERS AND VENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide louvers and vents as indicated:
   1. Extruded aluminum louvers.

1.02 PERFORMANCE REQUIREMENTS

A. Wind Loads: Provide aluminum louvers, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of latest edition of ASCE 7:
   1. Design wind velocity shall be as indicated on structural drawings with a wind load importance factor of 1.00.

B. Impact-Resistance Test Performance: Provide aluminum louvers that pass large and small missile-impact tests, as required by systems' location above grade, and cyclic-pressure tests according to testing requirements of authorities having jurisdiction.
   1. Aluminum louvers shall withstand the impact of wind-borne debris missiles in accordance with the impact and cyclic loading criteria per SBC/SSTD 12, ASTM E 1886, and ASTM E 1996.

1.03 SUBMITTALS

A. Submit for approval shop drawings, product data.
B. Manufacturer certificates: Signed by manufacturer certifying that louver assemblies comply with requirements specified in “Performance Requirements” Article.

1.04 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Extruded aluminum louvers: Stationary, wind driven rain-resistant, horizontal sight proof drainable blade louvers, 5” deep, .081 inch extruded aluminum alloy 6063-T5 frame and blades, minimum net free area 44%, 5/8” x .040 inch removable expanded, flattened aluminum bird screen on interior face; provide model EHV901D as manufactured by Greenheck or approved equal.
   1. Louver shall meet the requirements of performance of AMCA 550 without use of a damper.
   2. Size: height and width for each louver indicated shall be generally as indicated on the plans. Submit final dimensions to meet specified free area for make and model submitted for each louver indicated.

3. Provide with manufacturer’s optional extended sill and head and jamb flanges.

B. Finish: Kynar 500 – 70% PVDF with total dry film thickness of 1.2 mils. Color shall be custom to match adjacent prefinished metal wall panels and as selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with AMCA Standard 500 and provide units with AMCA Certification rating seal. Comply with SMACNA "Architectural Sheet Metal Manual" except as otherwise indicated.

B. Take field measurements prior to fabrication. Install units plumb and level; isolate dissimilar materials to prevent corrosion. Touch-up damaged coatings.

C. Provide separate continuous sills where needed to prevent water penetration. Maintain equal blade-to-blade and blade-to-frame spacing for uniform appearance. Provide concealed vertical mullions with reinforcement as needed. Provide anchors, supports and accessories as needed. Provide gaskets, flashings and fillers as necessary to make installation water tight.

END OF SECTION 10200

SECTION 10440 - SPECIALTY SIGNS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide specialty building signage.

1.02 SUBMITTALS

A. Submit for approval samples, shop drawings, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. All signs shall comply with Florida Accessibility Code for Building Construction. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Panel signs; as manufactured by ROWMARK, Kensington, CT or approved equal.

1.	Material:	Laminated plastic, 1/32” H. raised graphics
2.	Size:	Minimum 6 inches square, radiused corners
3.	Face Finish/Color:	Matte finish/Color selected by Architect
4.	Number Style:	Helvetica Medium
5.	Number Size:	1 inch
6.	Number Copy Position:	Top left
7.	Letter Style:	Helvetica Medium
8.	Letter Size:	3/4" uppercase
9.	Letter Copy Position:	Bottom left
10.	Braille:	Grade 2, left justified below number/letter
11.	Number/Letter Color:	White
12.	Mounting:	Non-corrosive fasteners and anchors

B. Cast Letters: Contractor provided and installed 8” high, individual, clear, anodized, aluminum.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Panel signs shall be wall mounted at sixty (60) inches above finish floor to center of sign on latch side of doors. Exact location shall be as directed by Owner.

B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance.

C. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

D. Restore damaged finishes. Clean and protect work from damage.

3.02 SIGN SCHEDULE

A. Space Identification: Provide sign indicating room name and FISH number for each space identified on floor plan.

B. Accessibility Signage: In addition to room name and number, provide sign with international symbol of accessibility at all toilet rooms.

C. Maximum Occupancy: For Multipurpose room 801, provide a maximum occupancy sign adjacent to door 801A on the Multipurpose room side. Sign shall say:

MAXIMUM NUMBER OF PEOPLE
APPROVED IN THIS SPACE IS
532

END OF SECTION 10440

SECTION 10522 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide portable fire extinguishers and cabinets.

1.02 SUBMITTALS

A. Submit for approval shop drawings, product data.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions. Provide certification tag for each fire extinguisher in accordance with requirements of the State Fire Marshall.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fire extinguishers: UL listed and labeled units; Amerex Manufacturing Company or approved equal:
   1. Multi-purpose dry chemical type; UL rating 4A-60B:C.

B. Cabinets: Enameled steel box with trim, frame, door, and accessories; Larsen’s Manufacturing Company or approved equal:
   1. Mounting:
      a. Semi-recessed mounting.
   2. Trim:
      a. Exposed trim, 2 ½” rolled edge.
   3. Door and trim material
      a. Aluminum, clear anodized finish.
   4. Door style:
      a. Vertical Duo-panel.
   5. Identification:
      a. Vinyl lettering applied to cabinet door: “FIRE EXTINGUISHER”.

C. Fire-Rated Cabinets: Provide at rated walls, listed and labeled to meet requirements of ASTM E 814 for fire-resistance rating of wall.
   1. Construct fire-rated cabinets with double walls fabricated from 0.0478-inch thick, cold-rolled steel sheet lined with minimum 5/8-inch thick, fire-barrier material.
   2. Provide factory-drilled mounting holes.

D. Bracket-Mounted Extinguishers: Provide wall-hung bracket and vinyl label “Fire Extinguisher”.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide fire extinguisher and cabinet where indicated on plans as “FEC”. Install cabinets plumb and level at maximum 48” to top of extinguisher.
B. Provide fire extinguisher and wall-hung bracket where indicated on plans as “FE”. Install brackets at maximum 48” to top of extinguisher.
C. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction and with uniform appearance. Coordinate with work of other sections.
D. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION 10522

SECTION 10530 - ALUMINUM CANOPIES

PART 1 - GENERAL

1.01 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions and Division 1 - General requirements apply.
B. The Contractor shall furnish all labor, equipment and perform all work and services for aluminum walkway cover and bus canopy as shown on drawings and as specified, in accordance with provisions of the contract documents, and completely coordinated with work of all other trades.
C. Although such work is not specifically indicated, furnish and install all supplementary of miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secured and complete installation.
D. Verify dimensions by field measurements before fabrication, wherever possible without delaying project.

1.02 ACCEPTABLE MANUFACTURERS

A. Units as manufactured by either Gulf South Metals, Peachtree Protective Covers, Tennessee Valley Metals, Inc. or approved equal.
B. Substitution must be approved in writing by Architect 10 Days Prior to Bid.

1.03 SUBMITTALS

A. Provide shop drawings for fabrication and erection. Include plans, elevations and details. Show all anchorage and accessory items and finishes. Field verify all dimensions. All shop drawings shall be signed and sealed by a Registered Professional Engineer.
B. Provide samples of aluminum finishes for panels and extruded support structure.

1.04 QUALITY ASSURANCE

A. Manufacturers Qualifications: Provide Canopy system manufactured by a firm experienced in manufacturing systems that are similar to those indicated for this project and have a record of successful in-service performance.
B. Design Criteria: The drawings indicate sizes, profiles and dimensional requirements of the Canopy system. Systems having equal performance characteristics with deviations from indicated dimensions and profiles may be considered provided deviations do not change the design concept or intended performance. The burden of proof for product equality is on the bidder.
    1. Covered Walkways and all components thereof shall be designed in compliance with the latest Florida Building Code for wind loading.
    2. Design wind velocity shall be as indicated on structural drawings with a wind load importance factor of 1.0.

1.05 JOB CONDITIONS

A. Verify suitability of substrate to accept installation of protective covers.
B. Installer assumes responsibility for performance.

PART 2 - PRODUCT

2.01 MATERIALS:

A. Aluminum Roof Panel: Provide extruded aluminum in sizes indicated on drawings or per engineered shop drawings with factory applied Kynar 500 on both faces.
B. Fascia/Gutter: Provide extruded aluminum rectangular sections in sizes indicated on drawings or per engineered shop drawings with factory applied Kynar 500 on all sides.
C. Walkway Columns and Beams: Provide extruded aluminum rectangular sections in sizes indicated on drawings or per engineered shop drawings with factory applied Kynar 500 on all sides.
D. Custom color to match existing. Furnish samples of color for approval. Architect will make final determination of color.

PART 3 - EXECUTION

3.01 ERECTION

A. All material shall be assembled in strict accordance with the manufacturers' recommendations and approved shop drawings. The finished canopy shall be erected plumb with lines straight and true.
B. Provide sealant tape at lapped joints of nested ribbed or fluted sheets. And elsewhere as needed to weatherproof canopies.
C. Dissimilar materials: Where dissimilar metals are in contact, the surfaces shall be protected with a coat of bituminous paint or asphalt varnish.
D. The Canopy shall be designed and configured for a minimum amount of maintenance and occupant risk. Use pipe bollards to protect canopies from vehicle where required. There shall be no exposed hand holes or ledges for occupants to grasp. Fasteners must be concealed or tamper-proof. The fascia gutter must be large enough to permit cleaning by hand.
E. Cleaning and Touch-up: Clean surfaces of matter that could be detrimental to paint bond. Touch-up abrasions, marks, skips or other defects.

END OF SECTION 10530

SECTION 10800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide toilet accessories as scheduled or indicated.

B. Owner Furnished/Contractor Installed Items:
1. Paper Towel Dispensers.
2. Soap Dispensers.
3. Toilet Paper Dispensers.

C. Contractor Furnished/Contractor Installed Items:
1. Mirrors.
2. Sanitary Napkin Waste Receptacle; provide one in each female stall at Middle and High School only.
3. Grab Bars; ADA Compliant where applicable.
4. Underlavatory Guard.
5. Waste Receptacle.
6. Clothes Hook.
7. Custodial Shelf.

1.02 SUBMITTALS

A. Submit for approval product data, accessory schedule.

1.03 QUALITY ASSURANCE

A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mirrors: Stainless-steel angle, 0.05 inch thick, welded corners, one-piece galvanized steel wall-hanger, size 18”x36” unless otherwise indicated; American Specialties 0600A or approved equal.
B. Sanitary Napkin Waste Receptacle: White metal manufactured by Hospital Specialty Company (HOSPECO) Cleveland, Ohio 44103; Model No. ND-1W or approved equal.
C. Grab Bar Units: Satin finish, 1 ¼” outside diameter, 18 gage, Type 304 stainless steel with concealed mounting; American Specialties, Inc. or approved equal.
D. Underlavatory Guard: ADA conforming pipe enclosure for supply and drain piping assemblies that prevent direct contact with and burns from piping, high-impact stain-resistant molded rigid vinyl, color white; Truebro Lav-Shield or approved equal.
E. Waste Receptacle: Rubbermaid wall mount – half round base only; Model No. 5M795 or

approved equal.

F. Clothes Hook: Stainless steel robe hook, single rectangular ½" x 1" post, concealed mounting plate; American Specialties 7340-S or approved equal.

G. Custodial Shelf: Stainless steel unit 36" long with 8" deep shelf, three hooks, four spring-loaded mop/broom holders, and rod suspended beneath shelf; American Specialties 1315-4 or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated. Coordinate with work of other sections.

B. Install grab bars to withstand a downward load of at least 250 lb, when tested according to method in ASTM F 446.

C. Restore damaged finishes and test for proper operation. Clean and protect work from damage.

END OF SECTION 10800

SECTION 11480 - ATHLETIC EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. The Work required under this Section consists of providing Athletic Equipment, accessories and necessary mounting and installation hardware as indicated.

1.02 SUBMITTALS

A. Product Data: For each type of equipment specified.
B. Shop drawings shall indicate the model number, type of material, gauges or thickness of metal, finishes and details of construction, and attachment. Provide layout of gymnasium showing location dimensions for each piece of equipment.
C. Maintenance Data: For Athletic Equipment to include in the Maintenance Manuals specified in Division 1.

1.03 PROJECT CONDITIONS

A. Loose items of equipment shall be turned over to the Owner after being unpacked or uncrated, and checking for proper type, material, size, and fit of each accessory. Obtain receipt from Owner for items turned over. No claim may be made for items turned over to the Owner without obtaining a receipt.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Products of the following manufacturers are acceptable as a Basis of Design quality for the Athletic Equipment specified herein. Minor differences in construction and products incorporated into the equipment is recognized to exist and may be acceptable. These variations must be submitted to the Architect at least ten days prior to bid date. Acceptance will be established by Addendum. However, manufacturers capable of providing specified products shall not, for convenience of their normal production methods, vary from specified products.
   1. Spalding, Jefferson, Iowa
   2. Porter Athletic Equipment Company, Broadview, Illinois
   3. Draper, Inc., Spiceland, Indiana
   4. Aalco Manufacturing Company, St. Louis, Missouri
   5. Performance Sports Systems, Pendleton, Indiana
   6. Jaypro Sports, Inc., Waterford, Connecticut
   7. Schelde North America, Grand Rapids, Michigan

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. Requests for Architect's approval must be accompanied by the "Substitution Request Form" and complete technical data for evaluation. All materials for evaluation must be

received by the Architect at least ten days prior to bid date. Additional approved manufacturers will be issued by Addendum.

C. Catalog numbers shown on the Athletic Equipment Schedule refer to items manufactured by American Athletic, Inc. Items by other approved manufacturers which serve the function of the American Athletic, Inc. items are to be considered equal.

2.02 BASKETBALL BACKSTOPS AND ACCESSORIES

A. Ceiling Suspended, Forward Fold and Side Fold, Front Brace Backstop (16' to 28' AFF)

1. Vertical drop frame assembly shall consist of a main, center mast of 6-5/8" diameter, heavy wall structural steel tubing. The diagonal side sway braces shall be fabricated from 2" square, heavy wall steel tubing and the ends shall be precision, angle-cut to provide maximum weld surface contact. (Formed, curved, pinch-cut, or flattened brace connections will not be approved as equal. The top horizontal spreader shall be fabricated from heavy 4" structural steel channel. The mast, sway braces and top horizontal spreader shall be welded to form a unitized, back-to-back, triangular type structural design to provide superior lateral stability.
2. Goal shall mount directly through the backboard and into a heavy structural steel weldment which shall be clamped to the 6-5/8" center mast to eliminate any strain on the backboard should a player hang on the goal (conforms to latest NCAA rules). All assemblies shall be attached to the 6-5/8" mast with heavy ¼" precision, die-cut steel fittings, secured in place by 5/8" diameter U-bolt hardware. The upper backboard extension assembly shall provide the official NCAA and NFSHSA regulation of 6" (15.24 cm) from the front of the center mast to the face of the backboard. The center mast assembly shall be suspended by adjustable hangers to provide for precise plumbing of frame during installation. Support hangers shall be offset 1-1/2" from the centerline of the mast to properly weight lock the unit in playing position without the use of ropes, latches or springs.
3. Backstop shall be supported from 3-1/2" diameter pipe anchored to roof framing members by means of heavy formed, die-cut steel support fittings. Each attachment to roof framing must be capable of supporting a load exceeding 10,000 pounds with sufficient attachment points to acquire a 60:1 safety factor for support of entire backstop system. Certified test results shall be furnished upon request. Superstructure pipes to be reinforced with special truss-type bridging when roof framing centers exceed spans of 14'.
4. Each movable joint shall have a steel safety cable joining the two components as a safety feature to prevent all possibility of a failed unit falling to the floor.
5. Backstop retracting mechanism shall be a 1-7/8" brace assembly with an adjustable folding knee-joint assembly for precise field adjustment during installation. Knee joint locks backstop in playing position and is easily engaged for retraction by cable tension. Knee joint shall come standard with an integral safety cable.
6. All metal parts shall be finished with a flat black, electrostatic powder coat.

7. Basis of Design: Porter Athletic model number 90949 (front fold) and 90955 (side fold). Other acceptable products are:
    a. Draper model number TF-20 (front fold) and TBS-26-B (side fold)
    b. Aalco model number 136FJK (front fold) and 135SF (side fold)
    c. Performance model number 3107 (front fold) and 3109 (side fold)
    d. Jaypro model number J849-FFFB (front fold) and J855-SFB (side fold)

B. Basketball Backboards and Accessories
1. Rectangular Glass Backboard
    a. Backboard size shall be at regulation 3'-6" x 6'-0".
    b. Backboard frame shall be fabricated from 5/16" thick, 6063T6 anodized aluminum that is fitted to the glass with a shock absorbing material.
    c. Backboard frame shall be furnished with heavy steel gusset plates in each corner with key hole slots for mounting the backboard to support structures at standard mounting dimensions.
    d. Glass provided shall be a ½" tempered section with uniform load and impact strength. Official white border and target area are permanently "fired in" on the front of the glass.
    e. Goal mounting pattern is 5" x 4".
    f. Aluminum frame shall be pre-drilled for easy installation of bolt-on protective padding.
    g. Backboard can be installed either as a direct mount or an indirect mount. "T" mounting plate eliminates stress from the glass and distributes to the backboard frame (conforms to latest NCAA rules, BR-73, 0-5).
    h. All frame connection bolts are grade 8 and countersunk for smooth surface area. Bolts not countersunk will not be considered as equal.
    i. Backboard shall be covered with a 20-year warranty. The warranty shall be extended to lifetime on direct mount applications.
    j. Acceptable Products:
        1) Spalding Model Number 411007
        2) Porter Athletic Model Number 208-000
        3) Draper Model Number A0136
        4) Aalco Model Number 501S
        5) Performance Model Number AFRG42
        6) Jaypro Model Number GBAFR-42
2. Backboard Safety Padding, Bolt-on style (Glass Backboards)
    a. Padding designed to fit any 72" wide glass backboard.
    b. Pad shall consist of two pieces of molded, 9 pound density, self-skinning polyurethane foam. Durable skin minimizes the possibility of cracks and tears as on traditional pads.
    c. A positive bolt-on attachment system shall be provided to eliminate adhesive or peel & stick tape attachments. Pad sections are provided with internal, molded-in steel attachments, which are bolted securely to the frame of the backboard.
    d. Pad shall meet all requirements of the NCAA, NFSHSA, FIBA and NBA.
    e. Pads shall be covered with a five-year warranty.
    f. Acceptable Products:
        1) Spalding Model Number 413410 thru 413421
        2) Porter Athletic Model Number 326-000
        3) Draper Model Number A0142
        4) Aalco Model Number RBP-DS
        5) Performance Model Number PMCE

6) Jaypro Model Number MBBP-6

C. Basketball Goals and Nets

1. Breakaway Goal

a. Goal shall be designed to absorb shock loads due to slam dunking or hanging on the rim. Goal shall incorporate a positive lock, pressure release mechanism which is pre-set to provide rebound characteristics identical to those of a non-movable ring. Pressure release mechanism shall be field adjustable to comply with the latest NCAA recommendation (All competitive rings must be tested three times during the season for rebound / elasticity to ensure that this component is maintained) to provide the specified 35% to 50% energy absorption. After release and with the load no longer applied, the ring shall return automatically and instantaneously to the original, playing position.

b. Rim shall be fabricated from 5/8" diameter cold drawn alloy steel, round formed to an 18" inside diameter. Inside diameter of ring shall be positioned 6" from the face of the backboard by a heavy formed steel, hinged housing with a formed steel cover. Rim shall be rigidly braced by means of a 3/16" thick formed steel brace welded in position on the underside of the rim for maximum support.

c. Mounting pattern shall be universal to accommodate either a 5" x 5" or a 5" x 4" backboard pattern.

d. Goal shall be finished with an orange electrostatic powder coat.

e. Goal may be easily mounted to a backboard with a special slotted mounting system without removing the housing cover.

f. Goal shall be covered by a two-year warranty.

g. Acceptable Products:

1) Spalding Model Number 411528
2) Porter Athletic Model Number 245-500
3) Draper Model Number A0581
4) Aalco Model Number 28HS4
5) Performance Model Number 2000
6) Jaypro Model Number GBA-342A

2. Electric Winch

a. Winch shall be worm gear type, designed to hold backstop at any position when raising or lowering. Winch housing, base cable drum and bracket are machined from high strength aluminum alloy. The worm is machined from high strain tempered steel bar. All surfaces of the worm shaft are ground and the worm teeth and seal surfaces are polished after grinding for the utmost in efficiency and sealing capabilities. Worm shaft shall turn in sealed, precision thrust bearings. The shaft shall also be sealed by an additional seal on the outside of the sealed bearings.

b. Worm gear shall be machined from high strength forged bronze alloy for exceptional wearability and long life characteristics.

c. The worm and gear shall run in an oil bath within main shaft housing which is completely sealed by the worm shaft seal, and by a double lip seal around the polished cable drum shaft where it enters the housing. Unit is filled with oil and sealed at the factory.

d. Winch to be operated by means of a ¾ hp (12 amp) capacitor type 60 cycle, 115 volt, single-phase instant reversing electric motor with automatic thermal overload protection manufactured to NEMA specifications. The motor shall drive the winch by means of a direct drive gear box. Any winch requiring connecting V-belt and / or sprockets is not acceptable. The motor shall be controlled by a special, single-key, wall-mounted, momentary key switch. Dual key systems are not acceptable. Switch assembly shall be furnished with a stainless steel cover plate for mounting in a masonry wall box by the Electrical Contractor.

e. Drum shall be grooved for the cable and winch shall utilize a spring loaded cable tension roller. Drum shall be mechanically interconnected to a special rotary counting Up-Down limit switch assembly, which shall be mounted and pre-wired to motor as an integral part of the winch. Limit switch shall be furnished in a special, extruded aluminum housing with continuous slots for adjusting 20 amp micro switches to precisely limit the up and down operation of the winch. Winch shall be pre-wired with a 6'-0" long neoprene covered cable with twist-lock grounded type plug attached. Matching flange type receptacle is also provided.

f. Under no load conditions, RPM of drum is 11.5 and RPM of motor is 1725.

g. Wiring of all electrical components shall be in accordance with local area codes, and in accordance with manufacturer's instructions.

h. All conduit wiring, junction boxes and components not specified herein shall be furnished and installed by the Electrical Contractor.

i. Winch shall be covered by a two-year warranty.

j. Acceptable Products:
   1) Spalding Model Number 402742 (QR3000)
   2) Porter Athletic Model Number 707
   3) Draper Model Number 503085
   4) Aalco Model Number 75
   5) Performance Model Number 1194
   6) Jaypro Model Number Unknown TW-2000

D. Basketball Backstop Safety Lock

1. Safety lock shall incorporate a 2" wide nylon bolt rated at a 6000 pound breaking strength and entire unit to be tested to withstand a 1000-pound free fall load. Strap shall extend a maximum of 35'-0" and shall be automatically retracted and stored on a reel equipped with a special negator type constant force spring. Operation and locking action of strap shall be by means of integral cast components which are activated by centrifugal force to lock a basketball backstop before the unit travels 12" of free fall. Unit shall incorporate a fully automatic reset requiring no poles, ropes, levers or buttons.

2. Lock shall be inertia sensitive to automatically lock a basketball backstop in position at any time in storage or during the raising or lowering cycle due to a sudden surge of speed created by a possible malfunction of the hoisting apparatus, such as the winch, cable, pulleys, support fittings, etc.

3. Unit shall be furnished with a universal mounting bracket to fit on 3-1/2" diameter pipe mounted either parallel or at right angles to the unit. Belt shall be supplied with a special belt connection bracket for ease of securing directly to the basketball backstop.

4. Safety Strap shall be covered by a two-year warranty.

5. Acceptable Products:
   a. Spalding Model Number 402765

b. Porter Athletic Model Number 797
c. Draper Model Number A0549
d. Aalco Model Number AST
e. Performance Model Number 1100
f. Jaypro Model Number SBAL-30

2.03 VOLLEYBALL EQUIPMENT

A. Volleyball Floor Sleeves (Brass Cover Plates)
1. Provide floor sleeve to be cast in place as indicated on drawings. Sleeve shall be 3-1/2" diameter, extending 9" minimum into footing. Brass cover plate shall consist of a 6-3/4" O.D. x ½" thick machined brass casting, recessed flush with finished floor.
2. Sleeve shall be finished with electrostatic powder coat.
3. Acceptable Products:
a. Spalding Model Number 727
b. Porter Athletic Model Number 872-200
c. Draper Model Number 501006
d. Aalco Model Number BA-30
e. Jaypro Model Number PVB-753

2.04 WALL PADDING

A. Wall Pad with Polyurethane Foam
1. Provide wall wainscot padding as shown on drawings. Each panel shall be 2'-0" wide x 6'-0" high. Foam filler shall be 2" thick polyurethane with a weight of 1.8 pounds per cubic foot. Foam shall be cemented to 7/16" wood backing board and covered with flame retardant, vinyl laminated polyester, folded and stapled to back of board. Provide 1" nailing margin top and bottom. Cover material shall have a certificate of flame resistance from the state of California. The cover material shall have anti-fungal and anti-bacterial agents and is easily cleaned using mild soap and water.
2. Acceptable Products:
a. Spalding Model Number 481324
b. Porter Athletic Model Number 350-3
c. Draper Model Number Unknown
d. Aalco Model Number SWP12
e. Performance Model Number Unknown
f. Jaypro Model Number JWC-3026

PART 3 - EXECUTION

3.01 PREPARATION

A. Make such arrangements as are necessary to provide scaffolding to perform Work under this Section. Damage to floors, walls, equipment and the like shall be corrected at the expense of the Contractor under this section.

3.02 INSTALLATION

A. Install equipment in accordance with the manufacturer's printed instructions, drawings, specifications, and final shop drawings.
B. Equipment specified shall be installed by factory-trained and certified installers.
C. This contractor shall adjust all equipment for plumb and level.
D. Loose equipment shall be removed from packaging or crating, cleaned, and tested for proper operation before turning over to the Owner. Removable items shall be set in the various required positions to be checked for proper fit for floor inserts.

3.03 DEMONSTRATION

A. Work under this section shall include demonstrating the proper use and operation of equipment to the owner as may be required.

END OF SECTION 11480

SECTION 12494 - ROLLER SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes roller shades and motorized shade operators.

B. Related Sections include the following:

1. Division 6 Section "Miscellaneous Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Division 16 Sections for electrical service and connections for motor operators, controls, limit switches, and other powered devices and for system disconnect switches for motorized shade operation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.

1. Non-Motorized Shade Operators
2. Motorized Shade Operators

B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.

C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Ceiling suspension system members and attachment to building structure.
2. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
3. Shade mounting assembly and attachment.
4. Size and location of access to shade operator, motor, and adjustable components.

D. Samples for Initial Selection: For each colored component of each type of shade indicated.

1. Include similar Samples of accessories involving color selection.

E. Samples for Verification:

1. Complete, full-size operating unit not less than 12 inches (400 mm) wide for each type of roller shade indicated.
2. For the following products:

a. Shade Material: Not less than 3 inches (76 mm) square, with specified treatments applied. Mark face of material.
b. Shade Material: Not less than 12-inch- (300-mm-) square section of fabric, from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.
c. Valance: Full-size unit, not less than 12 inches (300 mm) long.

F. Product Certificates: For each type of roller shade, signed by product manufacturer.

G. Qualification Data: For Installer.

H. Product Test Reports: For each type of roller shade.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of roller shade.

J. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:

1. Methods for maintaining roller shades and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.
4. Motorized shade operator.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Source Limitations: Obtain roller shades through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Resistance Ratings: Passes NFPA 701.

D. 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.

E. Product Standard: Provide roller shades complying with WCMA A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 ROLLER SHADES

A. Basis-of-Design Product: Subject to compliance with requirements, provide Draper FlexShadeCL, Draper, Inc.

1. Single roller
2. Right hand clutch location
3. Stainless steel bead chain where manual operation indicated
4. Spring loaded cord tension device
5. Hem Bar Style: Closed pocket, 1” elliptical slat
6. Single Roller Hardware: Endcaps with Fascia
7. Motor Type: 120V AC, Sonesse motor, right hand location
    a. Control: Low Voltage Multiple Shade Control
8. Fabric Series: E Screen ME0220, color as selected by Architect from manufacturer’s full range.
    a. Openness Factor: 3%

b. Orientation: Regular roll

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.

B. Connections: Connect motorized operators to building electrical system.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 1 Section Demonstration and Training."

3.6 SCHEDULE - Provide Roller Shades of the type indicated for each location of the following window types:

A. Window Type B - Motorized Operation with jamb tracks and black-out screen backs

END OF SECTION 12494

SECTION 13125 – BLEACHERS

GENERAL

1.1 SUMMARY

A. Section Includes: Telescopic Gym Seating includes electrically operated multiple-tiered seating rows comprising of seat, deck components, understructure that permits closing without requiring dismantling, into a nested configuration for storing or for moving purposes.

1. Wall-attached telescoping stands

B. Related Sections:

1. Division 16 Electrical sections for electrical wiring and connections for electrically operated telescoping stands.

1.2 REFERENCES

A. Aluminum Association (AA):

1. ADM 1- Aluminum Design Manual

B. American Institute of Steel Construction (AISC):

1. AISC 360- Steel Construction Manual.

C. American Iron & Steel Institute (AISI):

1. AISI S100 – Design of Cold Formed Steel Structural Members.

D. American Society for Testing Materials (ASTM):

1. ASTM - Standard Specifications for Properties of Materials.

E. American Wood Council (AWC):

1. ANSI/AWC NDS (National Design Specification for Wood Construction).

F. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code – Steel
2. AWS D1.3 Structural Welding Code - Sheet Steel

G. Canadian Welding Bureau: CWB Division 3 W47.1

H. U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

I. Forest Stewardship Council:

1. Chain of Custody Certification (FSC-STD-40-004)

J. International Building Code (IBC): 2015

K. International Code Council (ICC): 2015

1. ICC 300: Standard for Bleachers, Folding and Telescopic Seating and Grandstands.

L. National Fire Protection Association (NFPA):

1. NFPA 101: 2015
2. NFPA 5000 2015: Building Construction and Safety Code
3. NFPA 70: National Electrical Code.

M. National Institute of Standards and Technology (NIST)

1. PS 1: Structural Plywood.

N. Southern Pine Inspection Bureau (SPIB):

1. SPIB: Standard Grading Rules for Southern Pine.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate and install telescopic gym seating systems to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connections. Apply each load to produce maximum stress in each respective component of each telescoping stand unit according to ICC 300 2015.

B. Manufacturer's System Design Criteria:

1. Gymnasium seat assembly; Design to support and resist, in addition to its own weight, the following forces:
   a.) Live load of 120 lbs. per linear foot (1.75 kN/m) on seats and decking
   b.) Uniformly distributed live load of not less than 100 psf (4.79 kN/m^2) of gross horizontal projection.
   c.) Parallel sway load of 24 lbs. per linear foot (0.35 kN/m) of row combined with (b.) above
   d.) Perpendicular sway load of 10 lbs. per linear foot (0.15 kN/m) of row combined with uniformly distributed live load above.
   e.) Parallel and Perpendicular sway loads are not applied concurrently.
2. Hand Railings, Posts and Supports: Engineered to withstand the following forces applied separately:
   a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction.
   b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction.
3. Guard Railings, Post and Supports: Engineered to withstand the following forces applied separately:
   a.) Concentrated load of 200 lbs. (0.89 kN) applied at any point and in any direction along top rail.
   b.) Uniform load of 50 lbs. per foot (0.73 kN/m) applied in any direction at top rail
   c.) Uniform load of 50 lbs. (0.22 kN) applied on an area equal to 1 ft^2 (0.09 m^2) applied on all guardrail infill panels.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Environmental Data Package: Provide project specific environmental data work sheet with project header and LEED calculations completed based on actual project weight and project price. Environmental Data Package required to be submitted with formal submittal package prior to project award.

1. Regional Manufacturing:
   a.) Provide manufacturing location and distance to project site by product material type as required. Use straight-line travel as defined by USGBC.
2. Recycled Content:
   a.) Provide Packaging Material Listing & Recycled Content by Material Type; total percentage of recycled content, total percentage of pre consumer and post consumer materials.
   b.) Provide Product Material Listing & Recycled Content by Material Type; total percentage of recycled content, total percentage of pre consumer and post consumer materials.
3. Indoor Environmental Quality:
   a.) Provide documentation that the specified product passes ANSI/BIFMA X7.1-2007 Standard for Formaldehyde and TVOC Emissions of Low-emitting Office Furniture Systems and Seating

b.) Provide documentation that the specified product solid core ply-form or engineered fiber panels are manufactured with resins that are free of added urea-formaldehyde.

4. Product Life Cycle Deconstruction & Reclaiming Opportunity:
   a.) Provide listing of product materials that can be recycled at the end of the product life cycle and re-enter the recycled or reuse material stream.

C. Shop Drawings: For telescoping stands in both stacked and extended positions. Show seat heights, row spacing and rise, aisle widths and locations, assembly dimensions, anchorage to supporting structure, material types and finishes.
   1. Electrical: Indicate power supply requirements.
   2. Graphics Layout Drawings: Indicate pattern of contrasting or matching seat colors.

D. Samples: For units with factory-applied finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified manufacturer and installer.

B. Welding certificates.

C. Product Test Reports: Load test to all loads, observed by a qualified independent testing laboratory, and certified by a registered professional structural engineer verifying the integrity of the manufacturer's design.

D. Warranty: Manufacturers standard warranty documents.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For telescopic bleacher to include video operations manual.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: A minimum of 40 years of experience manufacturing telescoping stands and can demonstrate continual design enhancement and 25-year minimum product life-cycle support of telescopic seating.

B. Installer Qualifications: Factory certification by the manufacturer.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Seating Layout: Provide telescoping stands to comply with ICC 300 2015 Standard for Bleachers, Folding and Telescopic Seating, and Grandstands, except where additional requirements are indicated or imposed by authorities having jurisdiction.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver telescoping stands in manufacturers packaging clearly labeled with manufacturer name and content.

B. Handle bleacher equipment in a manner to prevent damage.

C. Deliver the telescoping stands at a scheduled time for installation that will not interfere with other trades operating in the building when at all possible.

1.9 PROJECT CONDITIONS

A. Field Measurements: Coordinate actual dimensions of construction affecting telescoping stands installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.10 WARRANTY

A. Manufacturer's Warranty: Includes the repair or replacement of the defective product; or defective component thereof, with a comparable product; or component thereof, or a refund of the purchase price prorated over the warranty period.

1. Includes: Labor, materials, and freight for replacement or repairs.
2. Structural Component parts of Understructure Warranty Period: 5 years from Date of Acceptance
3. Decking systems, seating collections, electrical, portable and integral dolly systems, end closure curtains, surface material finishes Warranty Period 5 years from Date of Acceptance.

PART 2 PRODUCTS

A. Wood:

1. Lumber: NIST PS 20, southern pine complying with SPIB's "Standard Grading Rules for Southern Pine Lumber" for B&B Finish (B and better) grade-of-finish requirements.
2. Plywood: NIST PS 1, APA-grade trademarked, A-C grade.

B. Steel:

1. Structural-Steel Shapes, Plates, and Bars: ASTM A36.
2. Galvanized-Steel Sheet: ASTM A653, coating designation G60.
3. Uncoated Steel Strip; Non-Structural Components: ASTM A1011, Commercial Quality, Type B, Hot-Rolled Strip.
4. Uncoated Steel Strip; Structural Components: ASTM A1011 Grade 33 (228 MPa), Grade 36 (249 MPa), Grade 40 (276 MPa), Grade 45 (311 MPa), or Grade 50 (345 MPa), Structural Quality, Hot-Rolled.
5. Galvanized Steel Strip: ASTM A653 Grade 40 (276 MPa), structural quality, coating designation G60.
6. Tubing: ASTM A500, cold formed; Grade B.

C. Polyethylene Plastic: High-density polyethylene; injection molded, color-pigmented, textured, impact-resistant, and dimensionally stable.

2.2 MANUFACTURERS

A. Manufacturer: Hussey Seating Company, U.S.A.

1. Address: North Berwick, Maine, 03906.
2. Telephone: (207) 676-2271; Fax: (207) 676-9690.
3. Product: MAXAM Telescopic Gym Seat System.

B. Manufacturers: Approved Equals.

2.3 TELESCOPING STANDS

A. Wall-Attached Telescoping Stands**:** Forward-folding system with the rear of the understructure permanently attached to the floor and to the rear wall. Rear wall provides structural support and must support loads imposed by the bleacher.

2.4 DIMENSIONAL AND OPERATIONAL CRITERIA

A. Dimensions:

1. Bank Length: 55’-0”
2. Aisle Width: 4’-6”
3. Number of Tiers: 6
4. Row Spacing: 26 inches (660 mm)
5. Row Rise: 9-5/8 inches (244 mm)
6. Open Dimension: 14’-1 7/8”
7. Closed Dimension: 4’-10”
8. Overall Unit Height: 4’-10 1/16”
9. Net Capacity: 186

B. Operation: Integral Power

1. Integral Power: Pendant control unit
   a.) Limit Switches: Automatically stop integral power system when telescoping stands reach fully opened or closed positions.

2.5 SEATING

A. Polymer Seat System: Courtside Collection XC10

1. Material: Gas assist injection-molded, 100 percent recyclable HDPE, high density polyethylene.
2. Module Size: 18 inches (457 mm) long by 10 inches (254 mm) deep.
3. Module Load: Tested to 600 lbs. (2.67 kN).
4. Seat height range from deck to top of seat: 16-1/8 inches (410 mm)
5. Integrally molded end caps at aisle end locations.
6. Integrally molded recess pockets to accept seat number and row letters.
7. Integrally molded rear closure panel at back of seat to allow for "continuous clean sweep" of debris at deck level and minimized visibility of structural ribbing.
8. Color: As selected by Architect from manufacturers full range of colors

B. ADA Accessible Seating:

1. Locate first tier modular units to provide wheelchair-accessible seating at locations indicated on Drawings.
   a.) Flex-Row™: Provide first row modular recoverable seating units that can be closed to accommodate persons requiring ADA spaces (or any other temporary space needs) or opened for standard usage. Each Flex-Row unit shall have a handle for easy operation.

1.) Provide a black full-surround steel skirting with no more than ¾" floor clearance for safety and improved aesthetics.
2.) Provide a black injection molded end cap for the nose beam for safety and improved aesthetics.
3.) Provide a mechanical positive lock when the Flex-Row system is in both the open and closed position. Handle shall unlock the modular recoverable seating unit for operation.
4.) Flex-Row can be utilized with the full system in the open or closed position.
5.) Flex-Row modular units are designed to achieve multi-use front row seating to accommodate team seating, ADA requirements and facility specific requirements. Flex-Row units are available in modular units from 2 to 7 seats wide as well as full section widths.

2.6 RAILS, PANELS AND STEPS

A. End Rails:
   1. Self-storing
      a.) Provide steel self-storing starting no higher than tier 2 42 inches (1066mm) high above seat, end rail with tubular supports and intermediate members designed with 4 inch (102mm) sphere passage requirements.
   2. Material and Finish: Semi-gloss powder coated steel.
   3. Color: As selected by Architect

B. Center Aisle Rails:
   1. Auto-Rotating
      a.) Provide single pedestal mount handrails 34 inches (864mm) high with terminating mid rail. Permanently attached handrail shall rotate in a permanently mounted socket for rail storage. Rail shall automatically rotate, lock in the use position, unlock and rotate back to the stowed position as the gym seats open and close. Ends of the handrail shall return to the post, and not extend away from it. Rails having openings to avoid interference with closed decks are not acceptable
   2. Material and Finish: Semi-gloss powder coated steel.
   3. Color: As selected by Architect

C. Steps
   1. Sure-Step (Flip-up Front Aisle Step): Permanently hinged to the front row to ensure availability and ease of operation. Two 3" diameter x ¾" wide non-marking front wheels are provided so that the system can be operated with the Sure-Step in the stored or deployed position. All edges coined, hemmed or radiused with front edge protective rubber bumpers. Abrasive-backed non-slip tread identifier on leading edge of nosing. For aisle widths greater than 6'-0", two side by side hinged steps are provided.
   2. Intermediate Aisle Steps: Fully enclosed, at each vertical aisle. Full radius end caps on all four edges. Adhesive-backed abrasive non-slip tread surface.

2.7 COMPONENTS

A. Decking
   1. Plywood
      a.) 5/8 inch (16 mm) thick AC grade tongue and groove Southern Yellow Pine with clear urethane, high gloss finish.

B. Understructure:

1. Finish: Rust-inhibiting black finish
2. Hardware finish: Zinc-plated, Rust inhibiting black finish
3. Posi-locks and other surfaces: Powder coated black, Rust inhibiting black finish
4. Nose beam and Rear Riser beam: Nose beam shall be continuously roll-formed closed tubular shape of ASTM A653 grade 40 (276 MPa). Riser beam shall be continuously roll-formed of ASTM A653 grade 40 (276 MPa). Nose and Riser beam shall be designed with no steel edges exposed to spectator after product assembly. Nose beam and riser beams are through-bolted fore/aft to deck stabilizers and frame cantilevers to create the deck structure.
5. Frame: The frames are welded assemblies (one left hand, one right hand per tier) comprised of the following components:
   a.) Lower Track subassembly: ASTM A1011 Grade 50: Continuous Positive Interglide System (casterhorn) interlocks each adjacent frame casterhorn using an integral, continuous, anti-drift feature and captive interlock with adjustable row spacing at front to prevent separation and misalignment.
   b.) Lower Track Wheels: 3 per frame Not less than 5 inches (127 mm) diameter by 1-1/4 inches (32 mm) with non-marring soft rubber face to protect wood and synthetic floor surfaces, with molded-in sintered iron oil-impregnated bushings to fit 3/8 inch (10 mm**)** diameter axles secured with E-type snap rings.
      1.) Option: up to 6 wheels per frame for load distribution
   c.) Slant Columns: A500 Grade B, tubular shape.
   d.) Cantilever Subassembly: Consists of ASTM A1011 Grade 50 nose connection plate, cantilever, and riser attachment plate welded together into a subassembly.
6. Lock system: Casterhorns at the end sections of powered banks (minimally), and manual sections, contain a Low Profile Posi-Lock LX to lock each row in open position and allow unlocking automatically. Provide adjustable stops to allow field adjustment of row spacings.
7. Sway Bracing: ASTM A653 grade 40 (276 MPa), tension members bolted to columns.
8. Deck Stabilizer: A1011 Grade 45, member through-bolted to nose and riser at three locations per section. Securely captures front and rear edge of decking at rear edge of nose beam and lower edge of riser beam for entire length of section. Interlocks with adjacent stabilizer on upper tier using low-friction nylon roller to prevent separation and misalignment.

C. Fasteners: Vibration proof, in manufacturer's standard size and material.

2.8 ELECTRICAL OPERATION SYSTEMS

A. Integral Power

1. Default operation shall be with a removable pendant control unit which plugs into seating bank for tethered operator management of stop, start, forward, and reverse control of the power operation. Other modes of operation are optional.

B. PF1/2/3/4: Furnish and install Hussey PF(1/2/3/4), an integral automatic electro mechanical powered frame propulsion system, to open and close telescopic seating.

1. Electrical - Seating Manufacturer shall provide all wiring within seating bank, including pendant control. Motors, housing, and wiring shall be installed and grounded in complete accord with the National Electrical Code. The control system shall operate at low voltage (24V). The electrical contractor shall perform all connections at and upstream of the equipment specified herein and ensure that supplied voltage drops no more than 4% below nominal where power connects thereto.

2. Each unit for PF(1/2/3/4) is driven by a 1/2 horsepower, 1725 RPM motor.
   a.) 208V 3 Phase:
      1.) This 1.25 Service Factor motor runs on 208V at 60 Hz and draws a full load current of 1.8 amperes. The required power supply shall be 3 asynchronous phases of 120 Volts each, plus neutral plus ground, each with 20 Amp capacity.
      2.) This system shall be UL Listed in its entirety (motors, circuit protection, motor controls, user interface, enclosures, conductors and connectors all evaluated and approved for correct sizing and compatibility under maximum rated load on the motors) under UL Product Category FHJU, titled Electrical Drive and Controls for Folding and Telescopic Seating.
   b.) Each pair of Powered Frames shall consist of output shaft gear reducer with 6 inch (152mm) diameter x 4 inch (102mm) wide wheels covered with non-marring 1/2 inch (13mm) thick composite rubber, and operate the bleacher as follows:
      1.) PF1 – Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 2 drive wheels. Max pull approx 261 lbs [1161 N];
      2.) PF2 – Pulls at 46 feet / min [16.8 meters / min] with ½ Hp through 60:1 speed reduction to 4 drive wheels. Max pull approx 261 lbs [1161 N];
      3.) PF3 – Pulls at 25 feet / min [9.3 meters / min] with ½ Hp through 111:1 speed reduction to 4 drive wheels. Max pull approx 478 lbs [2126 N];
      4.) PF4 – Pulls at 25 feet / min [9.3 meters / min] with 1 Hp through 111:1 speed reduction to 4 drive wheels. Max pull approx 956 lbs [4253 N];

C. Options
   1. Plug & Play Power
      a.) The Plug & Play option enables safe cord and plug connection of the power system to the power supply, eliminates the need for a separate disconnect, and eliminates lockout tagout procedures at the bleacher. Electrical contractor shall provide and install the disconnect-rated receptacle and associated parts specified by the manufacturer. Manufacturer shall specify facility preparations for, and furnish and install a cord-and-plug connected power system. This option is available only with 208V 3 Phase.
   2. Limit Switches
      a.) Limit switches will automatically stop integral power operation when seating has reached the fully extended or closed position. Manufacturer shall furnish and install both open and closed limit switches for the integral power system. Power operation shall utilize a combination of contactors and limit switches to ensure the wiring is not energized except during operation.
   3. Wireless Control
      a.) Provide control of the bleacher extension and retraction by wireless means with a hand-held battery-operated controller. If technology is available at the time the order is placed, provide the option for cellular based wireless application (smart phone app), then advise the owner of this option and provide any additional costs associated with purchasing it.

2.9 FABRICATION

A. Fabricate understructure from structural-steel members in size, spacing, and form required to support design loads specified in referenced safety standard.

B. Weld understructure to comply with applicable AWS standards.

C. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.

D. Form exposed sheet metal with flat, flush surfaces, level and true in line, and without cracking and grain separation.

2.10 ACCESSORIES

A. Rear Deck Filler: Provide at rear deck level an extended rear deck filler. Available for wall attached and free standing applications. Available in 4 inch increments with a minimum of **[6 inches (152mm)]** and a maximum of **[50 inches (1270mm)] <Insert Number>**.

B. Rear Wall Column Cutouts: Provide custom bleacher cutouts at rear wall building columns. Top row(s) to be cut out and fitted to meet wall column conditions.

C. Vinyl End Closure Curtain: Provide closure curtains fabricated of vinyl-coated 14oz Polyester fabric on open ends of telescopic seating. Curtains to be permanently attached to wall or rear closure panel and secured to individual rows of seating. Curtain to open with seating unit into taught secure configuration and fold automatically as seating unit closes.

1. Curtain color to be selected from manufacturers standard color options.

2.11 GRAPHICS

A. CourtSide Graphic Logo: Decorative graphic logo that is applied to the applied to the integrally molded end cap recess area of the CourtSide 10 XC seat module.

1. Logo is approximately 4.7 inches (119 mm) x 3.5 inches (89 mm) with full color.
2. Logo is trimmed to a precise custom cut shape with two mounting holes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas where telescoping stands are to be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Tolerances:

1. Flooring and rear wall: Level and plumb within 1/8 inch (3 mm) in 8 feet (2438mm).
2. Maximum bleacher force on the floor of a 27 foot (8230 mm) section: Static point load of less than 300 psi (2068 kN/m^2).

B. Install telescoping stands to comply with referenced safety standard and manufacturer's written instructions.

3.3 ADJUSTING AND CLEANING

A. On completion of installation, lubricate, test, and adjust each telescoping stand unit so that it operates according to manufacturer's written operating instructions.

B. Clean installed telescoping stands on exposed surfaces. Touch up shop-applied finishes or replace components as required to restore damaged or soiled areas.

3.4 MAINTENANCE SERVICE

A. Service Capability: Show proof of full time service capability by factory certified technicians directly employed by the installer.

1. A four to eight-hour maximum on-site repair response is required during normal working hours, 8 a.m. to 5 p.m. weekdays (excluding holidays).
2. All Full Time Service Personnel shall be Factory Authorized and Trained.
3. Provide proof of Service Capability and a list of service parts regularly maintained in inventory.

3.5 DEMONSTRATION

Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain telescoping stands.

END OF SECTION 13125

SECTION 15005 - MECHANICAL GENERAL

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 Related Documents:

1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2.2 This is a Basic Mechanical Requirements Section. Provisions of this section apply to work of all Division 15 sections.

1.2.3 Review all other contract documents to be aware of conditions affecting work herein.

1.2.4 Definitions:

1.2.4.1 Provide: Furnish and install, complete and ready for intended use.

1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.

1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.

1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.

1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or

subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.

1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.

1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.

1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval.

1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.

1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Final Completion. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

1.9 Approval Submittals:

1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.

1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.

1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.

1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.

1.9.1.1.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

1.9.3 Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

1.9.4 Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than ¼" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable.

Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

1.10.1 Testing and Inspections: All testing required by the project specifications shall be coordinated with the owner's project manager and the engineer. A minimum of 36 hours notice shall be provided prior to the test.

1.11 O&M Data Submittals: Submit Operation and Maintenance data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

2.2 Equipment and Materials:

2.2.1 Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.

2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.

2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.
Materials of construction or finishes.
Thickness of gauge of materials.
Weight of item.
Deleted features or items.
Added features or items.
Changes in other work caused by the substitution.
Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls.

3.2.2 Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

3.2.7 Start of work will be construed as acceptance of suitability of work of others.

3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 15. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

3.10 Climate Control: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.

3.11 Record Drawings:

3.11.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.

3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.

3.12 Acceptance:

3.12.1 Commissioning: This project shall include Commissioning of the HVAC, Control, and related electrical systems. The services of the Commissioning Authority are provided under separate contract. Under this Contract, the Prime Contractor, Subcontractors, and Equipment Manufacturers shall provide labor and material as required to assist and participate in the Commissioning process for the scope of work as described in Section 15995 HVAC Systems Commissioning of the Project Specifications.

3.12.2 Test and Balance: Test and Balance for this project will be included in the project as an allowance. This project includes all labor and material required to assist the Test and Balance Contractor. Refer to Section 15970 Startup Requirements for HVAC Systems and 15985 Testing and Balancing of Mechanical Systems.

3.12.3 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

3.12.4 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in

operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

3.12.5 Operation and Maintenance Manuals: Furnish two complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Submit one digital copy in portable document format (PDF) on digital media. Manuals shall contain:

Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.

3.12.6 Record Drawings: Submit record drawings.

3.12.7 Test and Balance Report: Submit four certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection unless otherwise required by Division 1.

3.12.8 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

3.12.9 Control Diagrams: Laminate and mount on equipment room wall.

PROJECT NAME
PROJECT NUMBER

This is a sample cover sheet. Use one for each shop drawing.

ARCHITECT/ENGINEER: Watford Engineering, Inc.

CONTRACTOR: XYZ Construction

Use whatever standard headings you want here

SUBCONTRACTOR: ABC Mechanical Contractor

SUPPLIER: Jones Supply Co.

MANUFACTURER: Various

DATE: 2/15/2005

SECTION: 15545/Hydronic Specialties

1. Vent valves - Hoffman No. 62

List each item separately

2. In-line air separators - Bell & Gossett RL-4

Typical - list mfr name & model number

3. Diaphragm type compression tanks - Bell & Gossett B-200

4. Pump suction diffusers - Bell & Gossett ED-3

5. Triple duty valves - Bell & Gossett 3D-4S

6. Shot feeders - J. Woods No. 2

7. Pressure relief valves - Watts No. 6

8. Pressure reducing valves - Bell & Gossett No. 7

General Contractor's APPROVAL stamp must be on submittal.

END OF SECTION

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SECTION 15020 - CODES AND STANDARDS

1 GENERAL

1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.

1.2 This is a Basic Mechanical Requirements section. Provisions of this section apply to work of all Division 15 sections.

2 CODES

2.1 All work under Division 15 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.

2.2 Comply with regulations and codes of utility suppliers.

2.3 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.

2.4 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.

2.5 Additional codes or standards applying to a specific part of the work may be included in that section.

2.6 The following codes govern the work:

1) Florida Building Code Sixth Edition (2017)
2) Florida Building Code Sixth Edition (2017)-Plumbing
3) Florida Building Code Sixth Edition (2017)-Mechanical
4) Florida Building Code Sixth Edition (2017)-Fuel Gas
5) Florida Building Code Sixth Edition (2017)-Energy
6) Florida Building Code Sixth Edition (2017)-Accessibility
7) Florida Fire Prevention Code Sixth Edition (2017)
8) National Electric Code (NFPA 70).
9) Life Safety Code (NFPA 101).
10) Installation of Air Conditioning and Ventilation Systems (NFPA 90A)
11) Florida Americans with Disabilities Accessibility Implementation Act (October 1, 1993) as described in Accessibility Requirements Manual, Department of Community Affairs (January 1, 1997).
12) Americans with Disabilities Act Accessibility Guidelines (ADAAG), January, 1994.
13) 2014 State Requirements for Education Facilities, SREF

3 STANDARDS

All mechanical materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:

1) Underwriters' Laboratories (UL)
2) American National Standards Institution (ANSI)
3) American Society of Testing Materials (ASTM)
4) National Fire Protection Association (NFPA)
5) National Electrical Manufacturers Association (NEMA)
6) Air Conditioning and Refrigeration Institute (ARI)
7) Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
8) American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
9) Air Movement and Control Association (AMCA)
10) Standards of the Hydronic Institute (IBR)

END OF SECTION

SECTION 15030 - MECHANICAL RELATED WORK

1 DIVISION 1 - GENERAL REQUIREMENTS

1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 This is a Basic Mechanical Requirements section. Provisions of this section apply to work of all Division 15 sections.

1.3 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division 15 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

2 DIVISION 2 - SITE WORK

2.1 Specific requirements for excavation and backfill for underground piping are contained in Section 15190.

2.2 Refer to Division 2, Sitework for:

2.2.1 All water, sewer, and storm water piping greater than five feet from the building.

2.2.2 Site fire protection work.

2.3 The following work is part of Division 15:

2.3.1 All site heating chilled water piping and valve boxes.

3 DIVISION 3 - CONCRETE

3.1 Refer to Division 3, Concrete for:

3.1.1 Rough grouting in and around mechanical work.

3.1.2 Patching concrete cut to accommodate mechanical work.

3.2 The following is part of Division 15 work, complying with the requirements of Division .3

3.2.1 Curbs, foundations and pads for mechanical equipment.

4 DIVISION 4 - MASONRY

4.1 Refer to Division 4, Masonry for:

4.1.1 Installation of wall louvers.

4.1.2 Installation of access doors in walls.

5 DIVISION 5 - METALS

5.1 Refer to Division 5, Metals for:

5.1.1 Framing openings for mechanical equipment.

5.2 The following is part of Division 15 work.

5.2.1 Supports for mechanical work.

6 DIVISION 6 - WOOD AND PLASTIC

6.1 Refer to Division 6, Wood for:

6.1.1 Framing openings for mechanical equipment

7 DIVISION 7 - THERMAL AND MOISTURE PROTECTION

7.1 Refer to Division 7, Thermal and Moisture Protection for:

7.1.1 Caulking and waterproofing of all wall and roof mounted mechanical work.

7.1.2 Providing all vent flashing for metal roofs.

7.2 The following is part of Division 15 work, complying with the requirements of Division 7.

7.2.1 Fire barrier penetration seals.

8 DIVISION 8 - DOORS AND WINDOWS

8.1 Refer to Division 8, Doors & Windows for:

8.1.1 Installation of all door grilles.

8.1.2 Providing all undercuts

9 DIVISION 9 - FINISHES

9.1 Refer to Division 9, Finishes for:

9.1.1 Painting exposed ductwork, piping, and equipment.

9.1.2 Painting structural metal and concrete for mechanical work.

9.1.3 Painting door grilles and access panels.

9.1.4 Painting color-coded mechanical work indicated for continuous painting. See color schedule in Division 15 section, "Mechanical Identification".

9.1.5 Installation of access doors in gypsum drywall.

9.2 Colors shall be selected by the Architect for all painting of exposed mechanical work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.

9.3 Perform the following as part of Division 15 work:

9.3.1 Touch up painting of factory finishes.

9.3.2 Painting of all hangers.

10 DIVISION 10 - SPECIALTIES

10.1 Refer to Division 10 - Specialties for:

10.1.1 Fire extinguishers and fire extinguisher cabinets and accessories.

11 DIVISION 11 - EQUIPMENT

11.1 Refer to Division 11 - Equipment for all food service equipment to be provided.

11.2 Provide the following as part of Division-15 work:

11.2.1 All trim including faucets, waste connections, drain traps, vents, valves, piping, flashing, fittings, strainers, and other materials necessary to make equipment operational. Provide rough-in for all equipment. Provide final connections for all equipment.

11.2.2 All fixtures specified in Section 15430.

12 DIVISION 16 - ELECTRICAL

12.1 Mechanical contractor shall coordinate the exact electrical requirements of all mechanical equipment being provided with the electrical contractor. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the mechanical equipment basis of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this design will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

12.2 Mechanical contractor shall provide all HVAC control wiring including the Energy Management Control system sensors, alarms, and input/output signals and all relays, interlocks, warning lights, and control devices, in conduit and complying with the requirements of Division 16. The intent is for the mechanical contractor to be responsible for the entire HVAC control system, including point-to-point wiring.

12.3 Electrical contractor shall provide disconnect switches, starters, and contactors for mechanical equipment unless specifically noted as being furnished as part of mechanical equipment.

12.4 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all mechanical equipment, switches, starters, contactors, controllers, and similar equipment.

12.5 All duct-mounted smoke detectors shall be furnished and wired by the electrical contractor and installed into the ductwork by the mechanical contractor.

END OF SECTION

SECTION 15105 - PIPES AND PIPE FITTINGS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to pipes and pipe fittings specified herein.

1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 Codes and Standards:

1.4.1 Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.

1.4.2 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.

1.5 Test Report and Verification Submittals:

Submit welding certification for all welding installers.
Submit brazing certification for all brazing installers.

2 PRODUCTS

2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.3 Piping Materials/Products:

2.3.1 Soldering Materials:

2.3.1.1 Tin-Antimony (95-5) Solder: ASTM B-32, Grade 95TA.

2.3.1.2 Silver-Phosphorus Solder: ASTM B-32, Grade 96TS.

2.3.2 Pipe Thread Tape: Teflon tape.

2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.

2.3.4 Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast iron flanges; raised-face for steel flanges, unless otherwise noted.

2.3.5 Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials. Materials shall be determined by installer to comply with installation requirements.

2.3.6 Brazing Materials: Silver content of not less than 15%. Materials shall be determined by installer to comply with installation requirements.

2.4 Copper Tube and Fittings:

2.4.1 Copper Tube:

2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.

2.4.1.2 ACR Copper Tube: ASTM B280.

2.4.1.3 DWV Copper Tube: ASTM B306.

2.4.2 Fittings:

2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.

2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4.2.3 Wrought-Copper Solder-Joint Drainage Fittings: ANSI B16.29.

2.4.2.4 Cast-Copper Flared Tube Fittings: ANSI B16.26.

2.5 Steel Pipes and Pipe Fittings

2.5.1 Pipes:

2.5.1.1 Black Steel Pipe: ASTM A-53 or A-120, seamless.

2.5.1.2 Galvanized Steel Pipe: ASTM A-53 or A-120, seamless.

2.5.2 Pipe Fittings:
2.5.2.1 Threaded Cast Iron: ANSI B16.4.

2.5.2.2 Threaded Malleable Iron: ANSI B16.3; plain or galvanized as indicated.

2.5.2.3 Malleable Iron Threaded Unions: ANSI B16.39; selected by installer for proper piping fabrication and service requirements including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.

2.5.2.4 Threaded Pipe Plugs: ANSI B16.14.

2.5.2.5 Flanged Cast Iron: ANSI B16.1, including bolting.

2.5.2.6 Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing.

2.5.2.7 Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns, rated to match connected pipe.

2.5.2.8 Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than schedule 80 pipe where length remaining unthreaded is less than 1 ½ inches, and where pipe size is less than 1 ½ inches, and do not thread nipples full length (no close-nipples).

2.6 Plastic Pipes and Fittings:

2.6.1 Pipes:

2.6.1.1 PVC DWV Pipe: ASTM D-2665, Schedule 40.

2.6.1.2 PVC Sewer Pipe: ASTM D-3034.

2.6.2 Fittings:

2.6.2.1 PVC Solvent Cement: ASTM D-2564.

2.6.2.2 PVC DWV Socket: ASTM D-2665.

2.6.2.3 PVC Sewer Socket: ASTM D-3034.

3 EXECUTION

3.1 Installation

3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leak proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.

3.1.2 Comply with ANSI B31 Code for Pressure Piping.

3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to ½" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.

3.1.4 Concealed Piping: Unless specifically noted as “Exposed” on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.

3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.

3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.

3.2 Piping System Joints: Provide joints of the type indicated in each piping system.

3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

3.2.2 Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.

3.2.3 Flanged Joints: Match flanges within piping system, and at connection with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets. Bolts shall project 1/8" to 3/8" beyond nut face when tight.

3.2.4 Weld pipe joints in accordance with recognized industry practice and as follows. Be guided by ANSI B.31.

3.2.4.1 Weld pipe joints only when ambient temperature is above 0°F.

3.2.4.2 Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.

3.2.4.3 Use pipe clamps or tack-weld joints; 4 welds for pipe sizes to 10". All welds shall be open-butt.

3.2.4.4 Build up welds with root pass, followed by filler pass and then a cover pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.

3.2.4.5 Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.

3.2.4.6 At Installer's option, install forged branch-connection fittings wherever branch pipe is less than 3" and at least two pipe sizes smaller than main pipe indicated; or install regular "T" fitting. Weld-O-Let or equal.

3.2.5 Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.

3.2.5.1 Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.

3.2.5.2 PVC sewer pipe bell/gasket joints shall be installed in accordance with ASTM D-2321.

3.2.6 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.

3.3 Piping Installation

3.3.1 Install piping to allow for expansion and contraction.

3.3.2 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with a continuous plastic sleeve. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.

3.3.3 Underground Piping:

3.3.3.1 Provide plastic tape markers over all underground piping. Provide copper wire over all underground plastic piping. Locate markers 18" above piping.

3.3.3.2 Coat the following underground (uninsulated) pipes with a heavy coat of bitumastic or provide an 8 mil polyvinyl sleeve: black steel pipe, galvanized steel pipe, copper tubing.

END OF SECTION

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SECTION 15110 - VALVES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.

1.2 This section is a Division-15 Basic Materials and Methods section, and is part of each Division-15 section making reference to or requiring valves specified herein.

1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 Quality Assurance:

1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.

1.4.2 Valve Types: Provide valves of same type by same manufacturer.

1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing.

1.5 Approval Submittals: When required by other Division-15 sections, submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-15 section using the valves, not as a separate submittal. Submit valve comparison chart with applicable valves clearly marked if valves other than basis-of-design are to be used. For each valve, identify systems where the valve is intended for use.

Gate Valves. Type GA.
Check Valves. Type CK.
Ball Valves. Type BA.
Butterfly Valves. Type BF.

1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

2.3 Gate Valves:

2.3.1 Packing: Select valves designed for repacking under pressure when fully opened, equipped with non-asbestos packing suitable for intended service. Select valves designed so back seating protects packing and stem threads from fluid when valve is fully opened, and equipped with gland follower.

2.3.2 Comply with the following standards:

Cast Iron Valves: MSS SP-70. Cast Iron Gate Valves, Flanged and Threaded Ends.
Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.3.3 Types of gate (GA) valves:

1 Threaded Ends 2" and Smaller (GA1): Class 125, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-100. Nibco T-111. Crane 428. Milwaukee 148.

2 Soldered Ends 2" and Smaller (GA2): Class 125, bronze body, screwed bonnet, non-rising stem, solid wedge. Stockham B-108 or B-109. Nibco S-111. Crane 1334. Milwaukee 149.

3 Flanged Ends 2½" and Larger (GA3): Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham G-623. Nibco F617-0. Crane 465½. Milwaukee F2885.

4 Threaded Ends 2" and Smaller (GA4): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-122. Nibco T-131. Crane 431. Milwaukee 1150.

5 Soldered Ends 2" and Smaller (GA5): Class 150, bronze body, screwed bonnet, rising stem, solid wedge. Stockham B-124. Nibco S-134. Milwaukee 1169.

6 Threaded Ends 2" and Smaller (GA6): 175 WWP, bronze body, screwed bonnet, rising stem, OS&Y, solid wedge, UL-listed. Stockham B-133. Nibco T-104-0.

7 Flanged Ends 2½" and Larger (GA7): 175 WWP, iron body, bolted bonnet, rising stem, OS&Y, solid wedge, UL listed. Stockham G-634. Nibco F-607-0TS

8 Threaded Ends 2" and Smaller (GA8): Class 200, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-132. Nibco T-154-SS. Milwaukee 1174.

9 Flanged Ends 2½" and Larger (GA9): Class 250, iron body bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge. Stockham F-667. Nibco F-667-0. Crane 7½E. Milwaukee F-2894.

10 Threaded Ends 2" and Smaller (GA10): Class 300, bronze body, union bonnet, rising stem, solid wedge, renewable seat. Stockham B-145. Nibco T-174-SS. Crane 634E. Milwaukee 1184.

11 Flanged Ends 2½" and Larger (GA11): Class 300, cast steel body, bolted bonnet, rising stem, solid wedge, seal-welded seat rings. Provide trim to match use. Stockham 30-0F.

Crane 33.

12 Flanged Ends 2½" and Larger (GA12): 300 WWP, iron body, bolted bonnet, bronze mounted, rising stem, OS&Y, solid wedge, UL-listed. Stockham F-670. Nibco F-697-0.

2.4 Check Valves:

2.4.1 Construction: Construct valves of castings free of any impregnating materials. Construct valves with a bronze regrinding disc with a seating angle of 40º to 45º, unless a composition disc is specified. Provide stop plug as renewable stop for disc hanger, unless otherwise specified. Disc and hanger shall be separate parts with disc free to rotate. Support hanger pins on both ends by removable side plugs.

2.4.2 Comply with the following standards:

Cast Iron Valves: MSS SP-71. Cast Iron Swing Check Valves, Flanged and Threaded Ends.
Bronze Valves: MSS SP-80. Bronze Gate, Globe, Angle and Check Valves.
Steel Valves: ANSI B16.34. Steel Standard Class Valve Ratings.

2.4.3 Types of check (CK) valves:

1 Threaded Ends 2" and Smaller (CK1): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-319. Nibco T-413-BY. Crane 1707. Milwaukee 509.

2 Soldered Ends 2" and Smaller (CK2): Class 125, bronze body, screwed cap, horizontal swing, bronze disc. Stockham B-309. Nibco S-413-B. Crane 1707S. Milwaukee 1509.

3 Flanged Ends 2½" and Larger (CK3): Class 125, iron body, bronze-mounted, bolted cap, horizontal swing, cast-iron or composition disc. Stockham G-931 or G-932 as applicable. Nibco F918-B. Crane 373. Milwaukee F2974 as applicable.

4 Threaded Ends 2" and Smaller (CK4): 200 WWP, bronze body, screwed cap, horizontal swing, regrinding type bronze disc, for fire sprinkler use. Nibco KT-403-W.

5 Flanged Ends 2½" and Larger (CK5): 175 WWP, iron body, bolted cap, bronze mounted, composition disc, UL listed, with ball drip if required. Stockham G-940. Nibco F-908-W.

6 Threaded Ends 2" and Smaller (CK6): Class 200, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-345. Nibco T-453-B. Crane 36. Milwaukee 518/508.

7 Flanged Ends 2½" and Larger (CK7): Class 250, iron body, bronze mounted, bolted cap, cast-iron disc. Stockham F-947. Nibco F-968-B. Crane 39E. Milwaukee F2970.

8 Threaded Ends 2" and Smaller (CK8): Class 300, bronze body, screwed cap, Y-pattern swing, regrinding bronze disc. Stockham B-375. Nibco T-473-B. Crane 76E. Milwaukee 517/507.

9 Flanged Ends 2½" and Larger (CK9): Class 300, cast steel body, bolted cap, horizontal swing, seal welded seat rings, chromium stainless disc. Stockham 30-SF. Crane 159.

2.5 Ball Valves:

2.5.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.5.2 Construction: Ball valves shall be rated for 150 psi saturated steam and 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.5.3 Comply with the following standards:

MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.
MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.5.4 Types of ball (BA) valves:

1 Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing. Nibco T-585-70. Stockham S216-BR-R-T. Milwaukee BA125. Apollo 77-100.

2 Soldered Ends 2" and Smaller (BA2): Bronze three-piece full port body with adjustable stem packing. Nibco S-595-Y-66. Milwaukee BA350. Apollo 82-200.

3 Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas. Nibco T-585-70-UL.

4 Threaded Ends 2" and Smaller (BA4): 175 WWP, bronze two-piece body, UL listed for fire protection service. Nibco KT-585-70-UL and KT-580-70-UL.

5 Threaded Ends 2" and Smaller (BA5): 400 WWP, bronze two-piece body, for fire protection service. Nibco KT-580.

6 Threaded Ends 2½" and Smaller (BA6): 300 WWP, bronze three-piece body, gear operator with handwheel, indicator flag, accepts tamper switch, for fire protection, UL listed. Nibco T-505-4 and G-505-4.

7 Flanged Ends 2½" and Larger (BA7): Class 150, carbon steel full bore two-piece body with adjustable stem packing. Nibco F515-CS series. Apollo 88-240.

2.6 Butterfly Valves:

2.6.1 General: Comply with MSS SP-67, Butterfly Valves. Provide butterfly valves designed for tight shut-off. Where used for terminal or equipment removal or repair, select lug type valves. Select wafer type valves for other applications. Provide gear operators on all butterfly valves 6" and larger.

2.6.2 Types of butterfly (BF) valves:

1 Wafer Type 3" and Larger (BF1): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-512. Nibco WD 2110-3. Crane 42-FXB-TL. Milwaukee MW222E-8416.

2 Lug Type 3" and Larger (BF2): 200 CWP, cast-iron body, lever-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-712. Nibco LD 2110-3. Crane 44-FXB-TL. Milwaukee ML132B-8416.

3 Wafer Type 3" and Larger (BF3): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-522 and LG-521. Nibco WD 2110-5. Crane 42-FXB-G. Milwaukee MW 122B-8115.

4 Lug Type 3" and Larger (BF4): 150/200 CWP, cast-iron body, gear-operated, cadmium-plated ductile iron disc, Type 410 stainless steel stem, EPT seat. Stockham LG-722 and LG-721. Nibco LD 2110-5. Crane 44-FXB-G. Milwaukee ML 132B-8115.

5 Wafer Type 4" and Larger (BF5): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-52U. Nibco WD 3510-8.

6 Lug Type 4" and Larger (BF6): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-72U. Nibco LD 3510-8.

7 Grooved Type 4" and Larger (BF7): 175 WWP, cast-iron body, gear-operated, nickel-plated ductile iron or aluminum bronze disc, Type 410 stainless steel stem, EPT seat, UL listed. Stockham LG-82U. Nibco GD 1765-2.

2.7 Valve Features:

2.7.1 General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.7.2 Valve features specified or required shall comply with the following:

1 Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving. Provide for gate valves 8" and larger.

2 Drain: Comply with MSS SP-45, and provide threaded pipe plugs complying with applicable Division-15 pipe or tube section. Provide for gate valves 8" and larger.

3 Flanged: Provide valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5 (steel), or ANSI B16.24 (bronze).

4 Threaded: Provide valve ends complying with ANSI B2.1.

5 Solder-Joint: Provide valve ends complying with ANSI B16.18.

6 Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

7 Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

8 Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

9 Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

10 Mechanical Actuator: Provide factory-fabricated gears, gear enclosure, external chain attachment and chain designed to provide mechanical advantage in operating valve for all valves 4" and larger that are mounted more than 7'-0" above the floor, or are otherwise difficult to operate regardless of height.

3 EXECUTION

3.1 Installation:

3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.

3.1.4 Mechanical Actuators: Install mechanical actuators as recommended by valve manufacturer.

3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

3.2.1 Tube Size 2" and Smaller: Threaded valves. .

3.2.2 Pipe Size 2" and Smaller: Threaded valves.

3.2.3 Pipe Size 2½" and Larger: Flanged valves.

3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

3.5 Installation of Check Valves: Install in horizontal position with hinge pin horizontally perpendicular to center line of pipe. Install for proper direction flow.

END OF SECTION

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SECTION 15120 - PIPING SPECIALTIES

1 GENERAL

1.1 Drawings and general provisions of contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring piping specialties specified herein.

2 PRODUCTS

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

2.2 Escutcheons:

2.2.1 General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

2.2.2 Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

2.2.3 Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

2.3 Fabricated Piping Specialties:

2.3.1 Drip Pans: Provide drip pans fabricated from corrosion-resistant sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over ¼" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.

2.3.2 Pipe Sleeves: Provide pipe sleeves of one of the following:

2.3.2.1 Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage; 4" to 6" 16 gage; over 6", 14 gage.

2.3.2.2 Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

2.3.2.3 Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

2.3.3 Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:

2.3.3.1 Caulking and Sealant: Provide foam or caulking and sealant compatible with piping materials used.

3 EXECUTION

3.1 Pipe Escutcheons: Install pipe escutcheons on each pipe penetration through floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

3.2 Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line with full port ball valve to drain connection, and run to nearest plumbing drain or elsewhere as indicated.

3.3 Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves ¼" above level floor finish, and ¾" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.

3.3.1 Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings. Fill annular space with caulking or fire barrier sealant as required.

3.3.2 Install steel-pipe sleeves at floor penetrations. Fill annular space with caulking or fire barrier sealant as required.

3.3.3 Install iron-pipe sleeves at all foundation wall penetrations and at exterior penetrations; both above and below grade. Fill annular space with caulking or mechanical sleeve seals.

END OF SECTION

SECTION 15135 - VIBRATION ISOLATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to vibration isolation equipment.

1.3 Extent of vibration isolation required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 Approval Submittals: When required by other Division-15 sections, submit product data sheets for each type of vibration isolation equipment including configuration and rating data. Submit with Division-15 section using vibration isolation, not as a separate submittal. Provide calculations showing supported weight, deflection, and isolator size and type for each item of supported equipment. Submit for:

Equipment Mountings. Type EM.

1.5 O&M Data Submittals: Submit a copy of approval submittals for each type of vibration isolation equipment. Include this data in O&M Manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated products recommended by manufacturer for use in service indicated. Provide products of types and deflections indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes which properly fit with equipment. All metal parts installed outside shall be hot dipped galvanized after fabrication.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide vibration isolation equipment of: Mason Industries, Keflex, Consolidated Kinetics, Vibration Mountings & Controls, Wheatley or approved equal. All vibration isolators shall be supplied by a single approved manufacturer.

2.3 Equipment Mountings:

2.3.1 Select mountings with the required deflection and fastening means. Provide steel rails or bases as required to compensate for equipment rigidity and overhang.

2.3.2 Types of equipment mountings (EM):

1 Spring Mountings (EM1): Spring isolators shall be free-standing and laterally stable without any housing. All mounts shall have leveling bolts. Spring diameter shall be not less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Springs shall be so designed that the ratio of horizontal stiffness to vertical stiffness is approximately one.

Provide a nominal static deflection of at least 1.0". Basis of Design: Mason Industries SLFH.

2 Spring Mountings with Housings (EM2): Spring isolators shall consist of open, stable steel springs and include vertical travel limit stops to control extension when weight is removed. The housing of the spring unit shall serve as blocking during erection of equipment. Provide a nominal static deflection of at least 1.0". All mountings used outside shall be hot dipped galvanized. Basis of Design: Mason Industries SLR.

3 Spring Mountings with Housings (EM3): Spring isolators shall consist of open, stable steel springs with neoprene inserts to limit movement between upper and lower housing on start and stop. Provide a nominal static deflection of at least 1.0". Mountings shall be specifically designed for critical areas on light-weight floors. Basis of Design: Mason Industries C.

4 Neoprene Mountings (EM4): Double deflection neoprene-in-shear mountings shall have a minimum static deflection of 0.35". All metal surfaces shall be neoprene covered. The top and bottom surfaces shall be neoprene ribbed and bolt holes shall be provided in the base. Basis of design: Mason Industries ND.

5 Pads (EM5): Waffle or ribbed pattern neoprene pads shall be fabricated from 40-50 durometer neoprene. Provide rigid steel plate and mounting angles as required. Basis of design: Mason Industries Super W.

3 EXECUTION

3.1 Install vibration isolation devices for the duty indicated and for ease of inspection, adjustment, and proper operation. Install in accordance with the manufacturer's written instructions and coordinate with shop drawings of supported equipment.

3.2 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

3.3 Piping, ductwork and conduit shall not be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.

3.4 Equipment Mountings:

3.4.1 Unless otherwise shown or specified, all floor-mounted equipment shall be set on housekeeping equipment bases. Refer to Division-15 section “Supports, Anchors, and Seals”.

3.4.2 No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators, and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.

3.4.3 Align equipment mountings for a free, plumb installation. Isolators that are binding, offset or fully compressed will not be accepted.

3.5 Connections of Ducts: Ducts shall be connected to fan intakes and discharges by means of flexible connectors in accordance with Division-15 section "Ductwork Accessories" so that all vibrating equipment is fully isolated.

END OF SECTION

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SECTION 15140 - METERS AND GAUGES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring meters and gauges specified herein.

1.3 Extent of meters and gauges required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.

1.5 ANSI and ISA Compliance: Comply with applicable portions of ANSI and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.

1.6 Approval Submittals:

1.6.1 Product Data: When required by other Division-15 sections, submit manufacturer's technical product data for each type of meter and gauge. Submit with Division-15 section using meters and gauges, not as a separate submittal. Include scale range, ratings, and calibrated performance curves, certified where indicated. Submit for:

Thermometers
Pressure gauges
Gauge connector plugs
Automatic balancing valves

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit calibration curves and operating instructions for each type of meter or gauge. Include this data in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers (Thermometers and Pressure Gauges): Subject to compliance with requirements, Ashcroft, Ernst Gauge Company, Weksler, Marshalltown Instruments, Trerice, Weiss Instruments, Wheatley, Fluidyne or approved equal.

2.2 Glass Thermometers:

2.2.1 General: Provide glass thermometers of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.2.2 Case: Die cast aluminum finished in baked epoxy enamel, glass front, spring secured, 9" long.

2.2.3 Adjustable Joint: Die cast aluminum, finished to match case, 180° adjustment in vertical plane, 360° adjustment in horizontal plane, with locking device.

2.2.4 Tube and Capillary: Mercury filled, magnifying lens, 1% scale range accuracy, shock mounted.

2.2.5 Scale: Satin faced, non-reflective aluminum, permanently etched markings.

2.2.6 Stem: Copper-plated steel or brass for separable socket, length to suit installation.

2.2.7 Range: Conform to the following:

Chilled Water: 30° - 180°F with 2°F scale divisions.

2.3 Thermometer Wells: Provide thermometer wells constructed of brass or stainless steel, pressure rated to match piping system design pressure. Provide 2" extension for insulated piping. Provide cap nut with chain fastened permanently to thermometer well. Same manufacturer as thermometers.

2.4 Pressure Gauges:

2.4.1 General: Provide pressure gauges of materials, capacities, and ranges indicated, designed and constructed for use in service indicated.

2.4.2 Type: General use, 1% accuracy, ANSI B40.1 grade A, phosphor bronze bourdon type, bottom connection.

2.4.3 Case: Drawn steel or brass, glass lens, 4-½" diameter.

2.4.4 Connector: Brass with ¼" male NPT.

2.4.5 Scale: White coated aluminum with black scale.

2.4.6 Range: Select so that highest possible pressure does not exceed 75% of full scale.

2.5 Pressure Gauge Cocks:

2.5.1 General: Provide ¼" ball valves for use as pressure gauge cocks.

2.5.2 Snubber: ¼" brass bushing with corrosion resistance porous metal disc, through which pressure fluid is filtered. Select disc material for fluid served and pressure rating.

2.6 Gauge Connector Plugs:

2.6.1 Provide temperature gauge connector plugs pressure rated for 500 psi and 200ºF. Construct of brass and finish in nickel-plate, equip with ½" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8" O.D. probe assembly from dial type insertion thermometer. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.6.2 Provide pressure gauge connector plugs pressure rated for 500 psi and 200ºF. construct of brass and finish in nickel-plate, equip with ½" NPT fitting, with self-sealing valve core type neoprene gasketed orifice suitable for inserting 1/8" O.D. probe assembly from dial type insertion pressure gauge. Equip orifice with gasketed screw cap and chain. Provide extension, length equal to insulation thickness, for insulated piping. Pete's Plug or approved equal.

2.7 Automatic Balancing Valves:

2.7.1 General: Provide as indicated, threaded automatic balancing valves equipped with optional valve kits to measure the flow rate. Valves shall utilize a stainless steel flow mechanism that is factory-set with ±5% accuracy. The flow mechanism shall be removable with standard tools to change the flow rate setting. Provide dual hose meter kit. Provide threaded mini's for terminal unit coils and threaded high capacity for air handlers. Provide metal nameplate to indicate flow rate. Provide valves with pre-formed polyurethane insulation suitable for use on heating and cooling systems.

2.7.2 Acceptable Manufacturers: Flow Design, Griswold, Autoflow Products, Bell & Gossett.

3 EXECUTION

3.1 Installation of Temperature Gauges:

3.1.1 General: Install temperature gauges in vertical upright position, and tilt so as to be easily read by observer standing on floor.

3.1.2 Locations: Install in the following locations, and elsewhere as indicated:

At inlet and outlet of each water source heat pump.
At inlet and outlet of each hydronic coil.

3.1.3 Thermometer Wells: Install in piping tee where indicated, in vertical upright position. Thermometers shall have at least 75% of stem in moving fluid.

3.1.4 Temperature Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.2 Installation of Pressure Gauges:

3.2.1 General: Install pressure gauges in piping tee with pressure gauge cock, located on pipe at most readable position.

3.2.2 Locations: Install in the locations indicated.

3.2.3 Pressure Gauge Cocks: Install in piping tee with snubber.

3.2.4 Pressure Gauge Connector Plugs: Install in piping tee where indicated, located on pipe at most readable position. Secure cap.

3.3 Automatic Balancing Valves: Install on piping in accordance with the manufacturer's printed instructions. Verify proper operation over full range of control valve and pump operation.

3.4 Adjusting and Cleaning:

3.4.1 Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.

3.4.2 Cleaning: Clean windows of meters and gauges and factory-finished surfaces. Replace cracked or broken windows; repair any scratched or marred surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 15150 - SUPPORTS, ANCHORS, AND SEALS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Materials and Methods section, and is a part of each Division-15 section making reference to or requiring supports, anchors, and seals specified herein.

1.3 Extent of supports, anchors, and seals required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.

1.5 MSS Standard Compliance:

1.5.1 Provide pipe hangers and supports of which materials, design, and manufacture comply with ANSI/MSS SP-58.

1.5.2 Select and apply pipe hangers and supports, complying with MSS SP-69.

1.5.3 Fabricate and install pipe hangers and supports, complying with MSS SP-89.

1.5.4 Terminology used in this section is defined in MSS SP-90.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide supports and hangers by Grinnel, Michigan Hanger Company, B-Line Systems, or approved equal.

2.2 Horizontal-Piping Hangers and Supports: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.

2.2.1 Adjustable Steel Clevises: MSS Type 1.

2.2.2 Steel Double Bolt Pipe Clamps: MSS Type 3.

2.2.3 Adjustable Steel Band Hangers: MSS Type 7.

2.2.4 Steel Pipe Clamps: MSS Type 4.

2.2.5 Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.

2.2.6 Single Pipe Rolls: MSS Type 41.

2.2.7 Adjustable Roller Hanger: MSS Type 43.

2.2.8 Pipe Roll Stands: MSS Type 44 or Type 47.

2.3 Vertical-Piping Clamps: Except as otherwise indicated, provide factory-fabricated vertical-piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

2.3.1 Two-Bolt Riser Clamps: MSS Type 8.

2.3.2 Four-Bolt Riser Clamps: MSS Type 42.

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

2.4.1 Steel Turnbuckles: MSS Type 13.

2.4.2 Malleable Iron Sockets: MSS Type 16.

2.5 Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

2.5.1 Center Beam Clamps: MSS Type 21.

2.5.2 C-Clamps: MSS Type 23.

2.5.3 Malleable Beam Clamps: MSS Type 30.

2.5.4 Side Beam Brackets: MSS Type 34.

2.5.5 Concrete Inserts: MSS Type 18.

2.6 Saddles and Shields: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

2.6.1 Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6.2 Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation matching adjoining insulation.

2.7 Miscellaneous Materials:

2.7.1 Metal Framing: Provide products complying with NEMA STD ML 1.

2.7.2 Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.

2.7.3 Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

2.7.4 Heavy-Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance with AWS standards.

3 EXECUTION

3.1 Preparation

3.1.1 Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

3.1.2 Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.2 Installation of Building Attachments:

3.2.1 In areas of work requiring attachments to existing concrete, use self drilling rod inserts, Phillips Drill Co., "Red-Head" or equal.

3.3 Installation of Hangers and Supports:

3.3.1 General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

3.3.1.1 Horizontal steel pipe and copper tube 1-1/4" diameter and smaller: support on 6 foot centers.

3.3.1.2 Horizontal steel pipe and copper tube 1-1/2" diameter and larger: support on 10 foot centers.

3.3.1.3 Vertical steel pipe and copper tube: support at each floor.

3.3.2 Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

3.3.3 Paint all black steel hangers with black enamel. Galvanized steel and copper clad hangers do not require paint.

3.3.4 Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

3.3.5 Provision for Movement:

3.3.5.1 Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

3.3.5.2 Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

3.3.5.3 Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

3.3.6 Insulated Piping: Comply with the following installation requirements.

3.3.6.1 Shields: Where low-compressive-strength insulation or vapor barriers are indicated, install coated protective shields.

3.3.6.2 Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

3.4 Installation of Anchors:

3.4.1 Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

3.4.2 Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

3.4.3 Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and elbows. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.4.4 Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

3.5 Equipment Bases:

3.5.1 Provide concrete housekeeping bases for all floor mounted equipment furnished as part of the work of Division 15. Size bases to extend minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.

END OF SECTION

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SECTION 15160 - MECHANICAL IDENTIFICATION

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring identification devices specified herein.

1.3 Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-15 sections.

1.4 Refer to Division-16 sections for identification requirements of electrical work; not work of this section. Refer to other Division-15 sections for identification requirements for controls; not work of this section.

1.5 Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

2 PRODUCTS

2.1 General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-15 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.2 Painted Identification Materials

2.2.1 Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-¼" high letters for ductwork and not less than ¾" high letters for access door signs and similar operational instructions.

2.2.2 Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

2.2.3 Identification Paint: Standard identification enamel.

2.3 Plastic Pipe Markers

2.3.1 Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.

2.3.1.1 Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

2.3.1.2 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.4 Valve Tags:

2.4.1 Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp-engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" diameter tags, except as otherwise indicated.

2.4.2 Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" square black tags with white lettering, except as otherwise indicated.

2.5 Engraved Plastic-Laminate Signs:

2.5.1 General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style a minimum of 3/4" tall and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2.5.2 Thickness: 1/16" for units up to 20 sq. in. or 8" length; 1/8” for larger units.

2.5.3 Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.6 Stamped Nameplates: Provide equipment manufacturer's standard stamped nameplates for motors, AHUs, pumps, etc.

3 EXECUTION

3.1 Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 Ductwork Identification:

3.2.1 General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white.

3.2.2 Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.

3.2.3 Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.

3.3 Piping System Identification:

3.3.1 General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

3.3.1.1 Plastic pipe markers.

3.3.1.2 Stenciled markers, black or white for best contrast.

3.3.2 Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.

3.3.2.1 Near each valve and control device.

3.3.2.2 Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

3.3.2.3 Near locations where pipes pass through walls, floors, ceilings, or enter non-accessible enclosures.

3.3.2.4 At access doors, manholes and similar access points which permit view of concealed piping.

3.3.2.5 Near major equipment items and other points of origination and termination.

3.3.2.6 Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

3.3.2.7 On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.4 Valve Identification: Provide coded valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawn-watering hose bibs, and shut-off valves at plumbing fixtures, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. Coordinate code with operating instructions.

3.5 Valve Charts: Provide framed, glass covered valve charts in each mechanical room. Identify coded valve number, valve function, and valve location for each valve.

3.6 Mechanical Equipment Identification: Install engraved plastic laminate sign on a vertical surface on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served, as well as panel and circuit information. Provide signs for the following general categories of equipment and operational devices:

3.6.1 Main control and operating valves, including safety devices.

3.6.2 Fans, blowers, primary balancing dampers and VAV boxes.

3.6.3 HVAC air handlers and fan coil units.

3.6.4 DX Air Preconditioning Units (Indoor and outdoor units).

3.7 Stamped Nameplates: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier

shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.]

3.8 Adjusting and Cleaning:

3.8.1 Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

3.8.2 Cleaning: Clean face of identification devices, and glass frames of valve charts.

END OF SECTION

SECTION 15170 - ACCESS DOORS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring access panels specified herein.

1.3 Approval Submittals:

1.3.1 Product Data: When required by other Division-15 sections, submit product data for access doors. Submit with Division-15 section using access doors, not as a separate submittal. Include rating data.

1.4 O&M Data Submittals: Submit a copy of approval submittal. Include this data in O&M Manuals.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Acudor, Milcor, Jay R. Smith, Zurn, BOICO, Elmdor, or approved equal.

2.2 General: Where floors, walls and ceilings must be penetrated for access to mechanical work, provide types of access doors indicated. Furnish sizes indicated or, where not otherwise indicated, furnish adequate size for intended and necessary access. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.

2.3 Access Door Construction: Except as otherwise indicated, fabricate wall/ceiling door units of welded steel construction with welds ground smooth; 16-gauge frames and 14-gauge flush panel doors; 175° swing with concealed spring hinges; flush screw-driver-operated cam locks; factory-applied rust-inhibitive prime-coat paint finish.

2.4 Locks: Where indicated, provide flat pass key type , individually keyed unless otherwise indicated, 2 keys.

2.5 Fire Rated Access Doors: Where required furnish with 20-gauge insulated sandwich panel, automatic closing mechanism, cylinder type lock (self-latching with inside release mechanism), and continuous concealed steel hinge pin. Access doors shall carry the UL 1-½ hour "B" label.

3 EXECUTION

3.1 Access doors shall be installed to operate and service all mechanical equipment including valves, dampers, duct access panels, and other items requiring maintenance that are concealed above or behind finished construction. Access doors shall be installed in walls, chase and floors as necessary, but are not required in accessible suspended ceiling systems. Access doors shall have factory applied protective phosphate coating and baked enamel primer suitable for field painting.

3.2 Access doors shall be installed by the Division installing the substrate construction. However, responsibility for furnishing and determining location of access doors is part of this Division's work. The style of access door shall be suitable for construction into which installed.

3.3 Access doors shall be sized and located as required to provide proper maintenance and service access in accordance with the manufacturer's recommendations and code authority requirements for all devices and equipment.

END OF SECTION

SECTION 15180 - TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring the testing and other procedures specified herein.

1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.

1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

2 PRESSURE TESTS

2.1 General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.

2.2 Required test period is four hours.

2.3 No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.

2.4 Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.

2.5 Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.

2.6 During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.

2.7 Repair piping systems sections which fail required piping test. Disassemble and re-install using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

2.8 Pressure Test Requirements:

2.8.1 Soil, Waste, and Vent Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.

2.8.2 Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.

2.8.3 Chilled Water: Perform hydrostatic test at 150% of the normal operating pressure, but not less than 100 psig.

2.8.4 Fire Sprinkler System: Perform hydrostatic test at 200 psig.

3 CLEANING AND STERILIZATION

3.1 General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

3.2 Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.

3.3 Sterilization of Domestic Water Systems:

3.3.1 Prerequisites: All new hot and cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.

3.3.2 The shut off valve at the point of connection shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the point of connection.

3.3.3 The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.

3.3.4 After final flushing, all aerators shall be removed, cleaned, and reinstalled. New filters shall be provided in bottle fillers. After final flush the residual chlorine shall not exceed 0.2 parts per million.

3.3.5 The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.

3.3.6 Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

3.4 Chilled Water Pipe Cleaning: After completion of all work and operational check out of the HVAC installations and prior to acceptance of the project by the Owner, the following shall be accomplished. The completed piping systems shall be thoroughly flushed (reversed flushing) as needed to remove all dirt, debris, and any foreign matter that may have been trapped in the piping systems during construction. After flushing of systems is complete, the Contractor shall clean all main strainers and all strainers at air handlers, fan coil units. A second cleaning of all strainers will be required if requested by the Engineer. Contractor shall furnish and install all valves and piping stub outs in the piping systems as needed to accommodate this flushing operation. Install the valves and stub outs at a location and in a manner that will allow them to

remain in place for future flushing operations. The flushing and strainer cleaning operations shall be witnessed and approved by the Engineer and Owner's representative.

END OF SECTION

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SECTION 15190 - EXCAVATION & BACKFILL

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to or requiring excavation and backfill specified herein.

1.3 Existing Utilities: Underground utilities shown were taken from old drawings or surveys. The exact location of these utilities and irrigation branches and abandoned services are not known. Use extreme caution when excavating.

1.4 Refer to other Division-15 sections and/or drawings for specific requirements of the particular piping system being installed. Where another Division-15 section or the drawings conflict with requirements of this section, the other Division-15 section or the drawings shall take precedence over the general requirements herein.

1.5 OSHA: Contractor employee worker protection for all trenching and excavation operations shall comply with 29 CFR 1926.650 Subpart P and all current OSHA requirements.

1.6 Trench Safety Act: Contractor shall comply with all requirements of Florida Statutes Chapter 553, including the requirement to provide a separate line item to identify the cost to comply on a per lineal foot of trench and per square foot of shoring.

2 PRODUCTS

2.1 Sand: Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be of a grade equal to mortar sand.

2.2 Gravel: Clean, well graded hard stone or gravel, free from organic material. Size range to be from No. 4 screen retentions to 1".

2.3 Earth: Fill free of clay, muck, stones, wood, roots or rubbish.

2.4 Identification Tape: Polyethylene 6 inches wide, 0.004 inches thick, continuously printed with "CAUTION" in large letters and type of pipe below.

2.5 Copper Identification Wire: 14-gauge.

3 EXECUTION

3.1 Ditching and Excavation: Shall be performed by hand wherever there is a possibility of encountering obstacles or any existing utility lines of any nature whatsoever. Where clear and unobstructed areas are to be excavated, appropriate machine excavation methods may be employed. Avoid use of machine excavators within the limits of the building lines.

3.2 Bedding: Excavate to bottom grade of pipe to be installed, and shape bed of undisturbed earth to contour of pipe for a width of at least 50% of pipe diameter. If earth conditions necessitate

excavation below grade of the pipe, such as due to the presence of clay, muck, or roots, subcut and bring bed up to proper elevation with clean, new sand (as described in paragraph 2.1), deposited in 6" layers and tamped. Notify Architect/Engineer if subcut exceeds 12", or if bed is of an unstable nature. In this case a 6" minimum layer of gravel will be required before sand bedding begins. Submit cost proposal if the earth conditions require subcut in excess of 12" or if gravel is required to achieve proper bedding.

3.3 Placing: Pipe shall be carefully handled into place. Avoid knocking loose soil from the banks of the trench into the pipe bed. Rig heavier sections with nylon slings in lieu of wire rope to avoid crushing or chipping. Pipe which is handled with insulation in place, coated pipe, and jacketed pipe shall have special handling slings as required to prevent damage to the material.

3.4 Backfilling: Deposit clean new sand (as described in paragraph 2.1) to 6" above the pipe and tamp. Then deposit sand or earth carefully in 6" layers, maintaining adequate side support, especially on nonferrous piping materials. Compact fill in 6" layers, using mechanical means, up to the top elevation of the pipe, and in 12" layers to rough or finish grade as required. Fine grade and restore surface to original condition.

3.5 Special: Excavations shall be installed and maintained in satisfactory condition during the progress of the work. Subsurface structures are to be constructed in adequately sized excavations. De-watering equipment shall be installed and properly maintained where required. Shoring shall be employed in the event of unstable soil condition, and in all cases where required by OSHA regulations and necessary to protect materials and personnel from injury.

3.6 Identification: Install identification tape directly above all underground piping, one tape for each pipe where multiple pipes are installed. Depth of tape shall be at least 6 inches below finished grade and 24" above buried pipe. Install copper wire above non-metallic pipes.

3.7 Depth of Cover: Minimum cover for underground piping is two feet unless indicated otherwise.

END OF SECTION

SECTION 15205 - INSULATION FOR PLUMBING EQUIPMENT AND PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
Flexible unicellular piping insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.

2.3 Pipe Insulation Materials:

2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)

2.3.2 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200ºF.)

2.3.3 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.

2.3.4 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.

2.3.5 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

3.1 General:

3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".

3.1.4 Do not apply insulation to surfaces while they are hot or wet.

3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

3.2.1 Insulate the following piping systems (indoor locations):

3.2.1.1 Domestic hot water, ≤180° F: up to 2" pipe - 1½" thick, over 2" pipe 2" thick.

3.2.1.2 Domestic hot water, ≤140° F: up to 3" pipe - 1½" thick, over 3" pipe - 2" thick.

3.2.1.3 Cold water pipe in uninsulated spaces: ½" thick.

3.2.2 Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are allowed.

3.2.3 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.

3.2.4 Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

3.3 Flexible Unicellular Pipe Insulation:

3.3.1 Insulate the following piping systems:

3.3.1.1 Horizontal above-grade waste piping receiving condensate from air conditioning units to points of connection receiving waste from 4 or more fixtures - ½" thick.

3.3.1.2 Horizontal above grade waste piping receiving discharge from ice machines, coolers, freezers or similar units to points of connection receiving waste form 4 or more fixtures - ½" thick.

3.3.1.3 Floor drain or floor sink bodies located above ceiling or above grade and receiving condensate from air conditioning units.

3.3.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.

END OF SECTION

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SECTION 15210 - INSULATION FOR HVAC EQUIPMENT AND PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Fiberglass pipe insulation
Cellular glass pipe above ground insulation
Flexible unicellular piping insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Johns Manville, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.

2.3 Pipe Insulation Materials:

2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)

2.3.2 Cellular Glass Pipe Insulation: ASTM C552, Type II, Class 1. (Uncovered.)

2.3.3 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200ºF.)

2.3.4 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.

2.3.5 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated.

2.3.6 Bedding Compound for CHW Systems: Provide products to completely cover the piping or equipment being insulated. Products shall be low odor type. Foster 30-45 or Foster 95-50.

2.3.7 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

3.1 General:

3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".

3.1.4 Do not apply insulation to surfaces while they are hot or wet.

3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.

3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.1.7 Inspection: Prior to final finishing or jacketing of insulation, notify owner’s project manager and engineer for progress inspection. Refer to 15005 Mechanical General for notice requirements.

3.2 Cellular Glass Pipe Insulation (Above Ground):

3.2.1 Insulate the following piping systems:

3.2.1.1 Chilled water: smaller than 6" pipe - 1½" thick, 6" and larger pipe - 2" thick.

3.2.2 Indoor Concealed Locations: Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply cellular glass bedding compound to the pipe surface to achieve 100% coverage (chilled water piping only). Apply vapor barrier mastic to all edges of the cellular insulation and between joints in the insulation. Wire the cellular glass in place with stainless steel wire 9 inches on center. Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over or embedded in the insulation which extend halfway up the pipe insulation cover and at least 4" on each side of the hanger. Insulate anchors adequately to prevent moisture condensation problems. Finish cellular glass insulation in concealed locations by applying a white fire rated jacket with self sealing lap. Finish elbows and fittings with weather barrier sealant reinforced with white glass fabric.

3.2.3 Indoor Exposed and Mechanical Rooms: Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply cellular glass bedding compound to the pipe surface to achieve 100% coverage (chilled water piping only). Apply vapor barrier mastic to all edges of the cellular insulation and between joints in the insulation. Wire the cellular glass in place with stainless steel wire 9 inches on center. Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over or embedded in the insulation which extend halfway up the pipe insulation cover and at least 4" on each side of the hanger. Insulate anchors adequately to prevent moisture condensation problems. Finish cellular glass by applying a heavy coat of weather barrier sealant reinforced with white glass fabric to the exterior of the cellular glass. Cover straight piping with smooth, gloss finished, heavy gauge, blue PVC jacket. Use matching factory-made PVC covers for fittings and valves. Provide removable end caps for strainers. Jacketing shall be applied with the longitudinal seam positioned to shed water.

3.3 Flexible Unicellular Pipe Insulation:

3.3.1 Insulate the following piping systems:

3.3.1.1 Condensate drains from air conditioning units - ½" thick.

3.3.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.

3.3.3 Insulation outside the building shall be protected by a smooth 0.016" thickness aluminum jacket secured with aluminum bands on 12" centers. Elbows and fittings shall be protected by factory made fittings.

END OF SECTION

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SECTION 15230 - EXTERIOR INSULATION FOR DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:

Rigid duct insulation
Flexible duct insulation

1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Knauf, Owens-Corning, Johns Manville, Certainteed.

2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, coverings, sealers, mastic, and adhesive) with a flame spread rating of 25 or less, and a smoke-developed rating of 50 or less as tested by ANSI/ASTM 84.

2.3 Rigid Fiberglass Insulation Board: ASTM C612, Class 1 (non load bearing). Boards shall be 3 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.4 Flexible Fiberglass Insulation: ASTM C553, Type I, Class B-3 (temperature less than 350ºF). Duct wrap shall be 1 pcf density with UL rated aluminum foil vapor barrier (FSK).

2.5 General Purpose Mastic: Benjamin Foster 35-00 Series, Insulcoustic VIAC Mastic, Childers CP-10, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.6 Vapor Barrier Sealant: Benjamin Foster 30-35, Insulcoustic IC-501, 3M EC-1378, Childers CP-30, or approved equal. Provide "Low Odor" type. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.7 Adhesive: Benjamin Foster 85-20, Insulcoustic IC-205, 3M EC-35, Childers CP-82, Childers CP-89, or approved equal. The final selection of this product for the specific application indicated is the responsibility of the insulation supplier. The insulation system must meet the specified application.

2.8 Fiber-Glas Mesh: 10x10 Mesh. Foster Mastafab or equal.

3 EXECUTION

3.1 Installation of Rigid Insulation: Insulate all rectangular supply, return and outdoor air ductwork exposed in mechanical rooms, mezzanines, fan lofts or in any finished spaces with 1½" thick rigid fiberglass insulation with vapor barrier.

3.1.1 Clean and dry ductwork prior to insulating. Butt insulation firmly together to ensure complete and tight fit over surfaces to be covered. Install insulation materials with smooth and even surfaces. Maintain integrity of aluminum vapor barrier wherever possible. Extend insulation without interruption through walls, floors and similar ductwork penetrations except where otherwise indicated.

3.1.2 Install with facing to the outside with a maximum of 25% compression. Butt all insulation joints firmly together. Longitudinal seam of the vapor retarder must be overlapped a minimum of 2". Staples shall be outward clinch and placed approximately 6" on center. All penetrations, joints, seams, and damage to the facing shall be sealed with glass fabric and mastic prior to system startup. For rectangular ducts over 24" wide, secure the insulation to the bottom of the duct with mechanical fasteners spaced on 12" centers to reduce sag. Do not overcompress the insulation with the retainer. Larger ducts shall be secured with fasteners on 12-inch centers and 3 inches from all edges.

3.1.3 Apply open mesh glass fabric embedded in vapor barrier mastic. Then apply a second coat of general purpose mastic with aluminum grey color. This finish shall be complete over all rigid insulation.

3.2 Installation of Flexible Insulation: Insulate all new supply, return and outdoor air ductwork concealed above ceilings, in chases, or elsewhere, and the backs of all ceiling supply outlets with 2" thick fiberglass blanket insulation with vapor barrier unless noted otherwise elsewhere in this specification.

3.2.1 Insulate round elbows and fittings with wrap such that thickness is equal to adjoining duct covering. Clean and dry ductwork prior to insulating.

3.2.2 Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6-inch wide swaths with 6-inch spaces between swaths. Additionally secure insulation with perforated pins and Tuff-Bond or by self-sticking pins with a 3/8" self-tapping screw. Space on 12-inch centers and 3 inches from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein.

3.2.3 Lap all joints 2 inches and seal joints with 4-inch wide strips of open mesh glass fabric embedded in two coats of general purpose mastic.

3.2.4 Seal all punctures and breaks in aluminum vapor barrier with open mesh glass fabric and vapor barrier sealant.

END OF SECTION

SECTION 15310 - BUILDING SPRINKLER SYSTEM

1 GENERAL

1.1 Drawings and General provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of fire protection work is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to Division-2 sections for site fire protection piping and appurtenances; not work of this section.

1.5 Refer to other Division-15 sections for site fire protection piping and appurtenances; not work of this section.

1.6 Refer to other Division-15 sections for fire pumps and appurtenances; not work of this section.

1.7 Refer to Division-9 sections for painting of fire protection piping; not work of this section.

1.8 Refer to Division-16 sections for the following work; not work of this section.

1.8.1 Power supply wiring from power source to power connection on air compressors and local alarm bells. Include disconnects and required electrical devices, except where specified as furnished or factory-installed by manufacturer.

1.8.2 Fire alarm connections for all flow switches, pressure switches, and supervisory (tamper) switches.

1.9 Codes and Standards:

1.9.1 NFPA Compliance: Install fire protection systems in accordance with NFPA 13 "Standard for the Installation of Sprinkler Systems" and NFPA 14 "Standard for the Installation of Standpipe and Hose Systems".

1.9.2 UL Compliance: Provide fire protection products in accordance with UL standards; provide UL label on each product.

1.9.3 Fire Department/Marshal Compliance: Install fire protection systems in accordance with local regulations of fire department or fire marshal.

1.9.4 Screw Thread Connections: Comply with local Fire Department/Fire Marshal regulations for sizes, threading and arrangement of connections for fire department equipment to sprinkler systems.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Pipe and fittings
Basic pipe supports and hangers
Basic valves
Pressure gauges
Automatic sprinklers

1.10.2 Working (Shop) Drawings: Prepare working (shop) drawings of fire protection systems indicating pipe sizes, pipe locations, pipe elevations, fittings, shutoffs, hangers, equipment, and coordination with other building systems. Submittal shall show all requirements per NFPA-13.

1.11 Test Reports and Verification Submittals:

1.11.1 Certificate: Submit certificate of Aboveground Installation upon completion of fire protection piping work which indicates that work has been tested in accordance with NFPA 13 and that system is operational, complete, and has no defects.

1.11.2 Tag: Submit a copy of the sprinkler system tag. The installing fire sprinkler contractor shall be licensed in accordance with State Fire Marshal (SFM) Rule 4A-46. At the conclusion of the project and prior to the final inspection by the SFM the Contractor shall tag the fire sprinkler system in accordance with 4A-46.041.

1.12 O&M Data Submittals:

1.12.1 Record Drawings: At project closeout, submit record drawings of installed fire protection piping and products.

1.12.2 Maintenance Data: Submit a copy of all approval submittals. Submit maintenance data and parts lists for basic valves. Include these data in O&M manual.

1.12.3 NFPA 25: Provide a copy of NFPA 25 in each O&M Manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems. Where more than one type of material or products are indicated, selection is Installer's option.

2.2 Basic Identification: Provide identification complying with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification", in accordance with the following listing:

Fire Protection Piping: Plastic pipe markers. Fire piping exposed in mechanical and electrical rooms shall be painted red.

Fire Protection Valves: Plastic or brass valve tags

Fire Protection Signs: Provide the following signs:

At each sprinkler valve, sign indicating what portion of system valve controls and hydraulic design data.

At each outside alarm device, sign indicating what authority to call if device is activated.

At each auxiliary drain, a sign indicating location.

2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing. Where multiple listings are made for a particular type system, the material is the Installer's option.

2.4 Wet Pipe: Seamless or ERW black steel pipe; Schedule 40 for less than 8"; Schedule 30 for 8" and larger. Fittings and joints shall be as follows.

1 Class 125, cast-iron threaded fittings with threaded joints.

2 Mechanical grooved pipe coupling and fittings; cut-groove type with mechanical joints.

3 Wrought steel buttwelding fittings with welded joints.

2.4.1 Wet Pipe: Seamless or ERW black steel pipe; Schedule 10 for 5" and smaller; 0.134" wall thickness for 6"; and 0.188" wall thickness for 8" and 10". Allied XL piping is also acceptable.

1 Class 125, cast-iron threaded fittings with threaded joints, sizes 2½" and larger.

2 Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type with mechanical joints.

3 Wrought steel buttwelding fittings with welded joints.

2.4.2 Wet Pipe: Seamless or ERW black steel pipe; Schedule 7.

1 Class 125, cast-iron threaded fittings with threaded joints, sizes 2½" and larger.

2 Mechanical grooved pipe couplings and fittings; roll-groove or mechanical locking type with mechanical joints.

2.5 Basic Piping Specialties: Provide piping specialties complying with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties".

2.6 Basic Supports and Anchors: Provide supports and anchors complying with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors", in accordance with

the following listing:

Adjustable steel clevis hangers or adjustable steel band hangers for horizontal-piping hangers and supports.

Two-bolt riser clamps for vertical piping supports.

Steel turnbuckles and malleable iron sockets for hanger-rod attachments.

Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.

2.7 Basic Valves: Provide interior valves complying with Division-15 Basic Mechanical Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Standard Service Code-Required OS&Y Valves: GA-6, GA-7.

2.7.2 Standard Service Sectional Valves: GA-6, GA-7. BF-6, BF-7.

2.7.3 Standard Service Indicating Valves: GA-6, GA-7, BA-6.

2.7.4 Standard Service Trim Valves: GA-6, BA-4.

2.7.5 Standard Service Check Valves: CK-4, CK-5.

2.8 Special Valves:

2.8.1 General: Provide valves, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment connections.

2.8.2 Alarm Check Valve: Provide cast-iron water flow alarm check valve, 175 psi working pressure, with retard chamber.

2.8.3 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the following:

Grinnell Fire Protection Systems Co., Inc.
Grunau Sprinkler Mfr. Co., Inc.
Reliable
Viking Corporation

2.9 Basic Meters and Gauges: Provide meters and gauges complying with Division-15 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

2.9.1 Pressure gauges, 0-250 psi range.

2.10 Fire Protection Specialties: Provide fire protection specialties, UL listed, in accordance with the following listing. Provide sizes and types which mate and match piping and equipment

connections.

2.10.1 Water Flow Indicators: Provide vane type water flow switches, with adjustable retard.

2.10.2 Water-Motor Gongs: Provide 10" weatherproof, red enameled finish, water-motor gongs.

Electric Bell: Provide 10" weatherproof bell with red enameled finish, 90 db.

2.10.3 Supervisory Switches: Provide products recommended by manufacturer for use in service indicated.

2.11 Automatic Sprinklers: Provide automatic sprinklers and escutcheons of type indicated on drawings, and in accordance with the following listing. Provide quick response type automatic sprinklers. Provide fusible links for 165°F unless otherwise indicated.

2.11.1 Sprinkler Types

Upright.
Pendent.
Pendant with two-piece escutcheon assembly

2.11.2 Finish: chrome-plated for recessed heads in occupied areas. Chrome- plated for pendant heads in occupied areas. Cast brass for unoccupied areas.

2.11.3 Sprinkler Cabinet and Wrench: Furnish steel, baked red enameled, sprinkler box with capacity to store 10 sprinklers and wrench sized to sprinklers.

2.11.4 Acceptable Manufacturers: Subject to compliance with requirements, provide automatic sprinklers of one of the following:

Central Sprinkler Corp.
Grinnell Fire Protection Systems Co., Inc.
Star Sprinkler Mfg. Co. Inc.
Reliable
Viking Corp.

3 EXECUTION

3.1 General: Examine areas and conditions under which fire protection materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer. Any installation, modification, or alteration of the sprinkler system shall be performed only by a person under a certificate of competency issued by the State Fire Marshal.

3.2 Installation of Basic Identification: Install mechanical identification in accordance with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification." Install fire protection signs on piping in accordance with NFPA 13 requirements. Continuously paint exposed fire piping red in mechanical and electrical rooms.

3.3 Installation of Pipes and Pipe Fittings:

3.3.1 General: Install pipes and pipe fittings in accordance with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings."

3.3.2 Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that piping systems comply with requirements and serve intended purposes.

3.3.3 Coordinate with other work as necessary to interface components of fire protection piping properly with other work.

3.3.4 Install drain piping at low points of piping system. Provide dry drum drips where indicated.

3.3.5 Install hose outlet valves in piping where hose outlets are indicated.

3.3.6 Install sectional valves in inlet piping, at bottom of each riser, and in loops as indicated.

3.3.7 Install fire department connection valves in piping where fire department connections are indicated.

3.3.8 Install water flow indicators where indicated.

3.3.9 Mount supervisory switches on each sectional valve.

3.3.10 Install valved hose connections of sizes indicated, or ¾" size if not otherwise indicated, on sprinkler at ends of branch lines and cross mains and at locations where indicated. The intent is to meet the requirements of NFPA 13 and to achieve a fully drainable system.

3.3.13 Install Inspector's test connection where indicated, or at most remote point from riser.

3.4 Installation of Piping Specialties: Install piping specialties in accordance with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties."

3.5 Installation of Supports and Anchors: Install supports and anchors, in accordance with Division-15 Basic Mechanical Materials and Methods section, "Supports and Anchors."

3.6 Installation of Valves: Install valves in accordance with Division-15 Basic Materials and Methods section "Valves." Provide valves to isolate each riser and elsewhere as required by NFPA 13 .

3.7 Installation of Meters and Gauges: Install meters and gauges in accordance with Division-15 Basic Mechanical Materials and Methods section "Meters and Gauges."

3.8 Installation of Fire Protection Specialties: Install fire protection specialties as indicated, and in accordance with NFPA 13. Furnish wiring requirements to electrical Installer for electrical wiring of supervisory switches.

3.9 Field Quality Control:

3.9.1 Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush feed mains, lead-in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.

3.9.2 Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for period of 24 hours, at not less than 200 psi or at 50 psi in excess of maximum static pressure when maximum static pressure is in excess of 150 psi. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.

3.9.3 Repair or replace piping system as required to eliminate leakage in accordance with NFPA standards for "little or no leakage" and retest as specified to demonstrate compliance.

3.10 Cleaning and Inspecting: Clean and inspect fire protection systems in accordance with requirements of Division-15 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

3.11 Extra Stock:

3.11.1 Heads: For each style and temperature range required, furnish additional sprinkler heads, amounting to one unit for every 100 installed units, but not less than 5 units of each.

3.11.2 Wrenches: Furnish 2 spanner wrenches for each type and size of valve connection and fire hose coupling. Obtain receipt from Owner that extra stock has been received.

3.12 Owner Instruction: Provide technical services for one 4-hour period to instruct Owner’s personnel in operation and maintenance of building sprinkler systems. Schedule training date with Owner. Provide at least 7-day notice to Engineer and Owner of training date.

END OF SECTION

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SECTION 15405 - POTABLE WATER SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to appropriate Division-2 sections for exterior potable water system; not work of this section unless noted.

1.5 Insulation for potable water piping is specified in other Division-15 sections, and is included as work of this section. Insulation requirements include:

Domestic hot water piping

Cold water piping outside of the building envelope.

1.6 Excavation and backfill required in conjunction with water piping is specified in other Division-15 sections, and is included as work of this section.

1.7 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's technical product data and installation instructions for:

Valves
Strainers
Hose bibbs
Wall hydrants
Water hammer arresters
Meters and gauges
Relief valves

Trap primers
Access doors

1.9 Test Reports and Verification Submittals:

1.9.1 Disinfection: Submit report by Health Department.

1.10 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves, trap primers. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Florida Building Code-Plumbing where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option.

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Identification: Provide identification complying with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification". Provide manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6" wide x 4 mils thick. Provide blue tape with black printing reading "CAUTION WATER LINE BURIED BELOW".

2.4 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.4.1 Interior Water Piping:

2.4.1.1 Above Grade: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.

2.4.1.2 Below Grade: Copper tube; Type L, soft-annealed temper; no joints below floor.

2.5 Piping Specialties: Provide piping specialties complying with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties".

2.6 Supports and Anchors: Provide supports and anchors complying with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors".

2.7 Interior Valves: Provide valves complying with Division-15 Basic Mechanical Materials and Methods section "Valves", in accordance with the following listing:

2.7.1 Sectional and Shutoff Valves: GA1, GA2, GA3, BA1, BA2.

2.7.2 Drain Valves: GA1, GA2, BA1, BA2.

2.7.3 Throttling Valves: BA1, BA2.

2.7.4 Check Valves: CK1, CK2, CK3.

2.8 Hose Bibbs: Provide rough nickel plated hose bibbs with lock shield compression stop and removable handle, solid flange, female connection with ¾" male threaded hose end, and straight line type non-removable vacuum breaker with ¾" male threaded hose end. Acorn 8121 RCP or equal model by Woodford.

2.9 Interior Hose Bibbs (HBi): Provide complete bronze body hose bibbs inside stainless steel box with hinged access door with cylinder lock and “WATER” stamped on cover. Provide key operated control valve with all bronze interior parts, replaceable seat washer, screwdriver operated stop valve in supply, and 3/4” male threaded hose connection. Zurn Z1350 or equal by Acorn or Woodford.

2.10 Non-freeze Wall Hydrants: Provide ¾" anti-syphon, non-freeze wall hydrant with bronze casing, satin bronze box, straight inlet connection, and integral vacuum breaker-backflow preventer, Wade W-8625 or approved equal.

2.11 Water Hammer Arresters: Provide bellows type water hammer arresters, stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201. Precision Plumbing Products, Josam, Zurn, Amtrol, Wade, Jay R. Smith, or approved equal.

2.12 Meters and Gauges: Provide meters and gauges complying with Division-15 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

Thermometers
Pressure gauges
Calibrated balancing cocks

2.13 Combined Pressure-Temperature Relief Valves: Provide relief valves as indicated, of size and capacity as selected by Installer for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code. Provide bronze body, test lever and thermostat complying with ANSI Z21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210°F, and pressure relief at 150 psi. Watts, Cash, Zurn, or approved equal.

2.14 Trap Primers: Provide brass trap primers and distribution units to seal floor drains indicated on drawings. Trap primer valves shall be automatic, self contained type with no springs or diaphragms and shall not require adjustment. Trap primer valves shall be the type that can be installed anywhere on cold water piping. Distribution units shall supply 1-4 floor drains. Trap primer valves shall comply with ASSE 1018. Precision Plumbing Products PR-500, or approved equal. Where P-trap primers are indicated use "Prime-Eze" by Jay R. Smith, or approved equal.

2.15 Access Doors: Provide access doors to service all valves and other devices as required in accordance with Division-15 Basic Materials and Methods Section “Access Doors”.

3 EXECUTION

3.1 General: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Install mechanical identification in accordance with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification". Install underground plastic pipe markers during backfill, 6"-8" below grade.

3.3 Install water distribution piping in accordance with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings".

3.3.1 Install piping with 1/32" per foot (¼%) downward slope towards drain point.

3.3.2 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.4 Install piping specialties in accordance with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties".

3.5 Install supports and anchors in accordance with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.6 Install valves in accordance with Division-15 Basic Mechanical Materials and Methods section "Valves".

3.6.1 Sectional Valves: Install on each branch and riser, close to main, where branch or riser serves two or more plumbing fixtures or equipment connections, and elsewhere as indicated.

3.6.2 Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.

3.6.3 Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain potable water system.

3.6.4 Check Valves: Install where indicated.

3.6.5 Calibrated Balancing Cocks: Install in each hot water recirculating loop, and elsewhere as indicated.

3.7 Hose Bibbs and Wall Hydrants: Install on concealed piping where indicated with vacuum breaker. Mount 18 inches above grade or finished floor.

3.8 Install backflow preventers where indicated, and where required by Florida Building Code-Plumbing. Locate in same room as equipment being protected. Pipe relief outlet to nearest floor drain or outside as shown on the drawings. Provide test and report by State of Florida Certified Backflow Preventer Specialist.

3.9 Install pressure regulating valves where indicated. Provide inlet and outlet shutoff valves, and throttling valve bypass. Provide pressure gauge on valve outlet.

3.10 Install meters and gauges in accordance with Division-15 Basic Mechanical Materials and Methods section "Meters and Gauges".

3.11 Install relief valves on each water heater, and where indicated in accordance with the manufacturer's instructions. Pipe full size outside or to floor drain. Cut the end of the pipe at a 45° angle and terminate 6 inches above the floor or grade.

3.12 Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes

indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.13 Mechanical Equipment Connections: Connect hot and cold water piping system to mechanical equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.

3.14 Install water hammer arresters in upright position, in locations and of sizes indicated in accordance with PDI Standard WH-201.

3.15 Install trap primers as indicated, and in accordance with manufacturer's installation instructions. Provide access panels to all trap primers unless accessible through a lay-in ceiling.

3.16 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-15 Basic Mechanical Materials and Methods section “Access Doors”.

3.17 Piping Tests: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-15 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION

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SECTION 15410/SOIL, WASTE AND VENT SYSTEM

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for site sanitary system; not work of this section.

1.5 Refer to appropriate Division-2 sections for exterior sanitary sewer system required in conjunction with soil and waste systems; not work of this section.

1.6 Insulation for soil and waste systems is specified in other Division-15 sections, and is included as work of this section. Insulation requirements include:

1.6.1 Horizontal above grade waste pipes receiving discharge from ice machines, coolers, freezers or similar units to points of connection receiving waste from 4 or more fixtures.

1.6.2 Horizontal above grade waste pipes receiving condensate from air conditioning equipment to point of connection receiving waste from 4 or more fixtures.

1.7 Excavation and backfill required in conjunction with soil, waste and vent piping is specified in other Division-15 sections and is included as work of this section.

1.8 Refer to Division-7 section "Flashing and Sheet Metal" for flashings required in conjunction with soil and waste systems; not work of this section.

1.9 Code Compliance: Comply with applicable portions of Florida Building Code-Plumbing pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.

1.10 Approval Submittals:

1.10.1 Product Data: Submit manufacturer's technical product data for:

Cleanouts
Floor drains

1.11 O&M Data Submittals: Submit a copy of all approval submittals. Include these data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure

ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.

Underground-Type Plastic Line Marker: Manufacturer's standard permanent, bright-colored, continuous-printed plastic tape, intended for direct-burial service; not less than 6" wide x 4 mils thick. Provide green tape with black printing reading "CAUTION SEWER LINE BURIED BELOW".

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Above Ground Soil, Waste, and Vent Piping:

2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.

2.3.2 Underground Building Drain Piping (within 5 feet of the building):

2.3.2.1 Pipe Size 6" and Smaller: Polyvinyl chloride sewer pipe (PVC); Type DWV; PVC plastic type DWV socket-type.

2.4 Pipe Specialties: Provide piping specialties complying with Division-15 Basic Materials and Methods section "Piping Specialties".

2.5 Supports and Anchors: Provide supports and anchors complying with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors".

2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade, Zurn.

2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1 countersunk head.

2.6.2 Cleanout for PVC Systems:

2.6.2.1 Floor Cleanouts: Cast-iron body with adjustable head, brass plug, and scoriated nick-brass cover. Furnish with carpet flange for carpeted floors. Furnish with recessed cover for tile floors. Furnish with clamping ring for floors with membrane. Wade W-6030 hub outlet for push-on.

2.6.2.2 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.

2.6.2.3 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug. Square 8.75”x8.75” hinged wall access cover, with scoriated nickel bronze finish.

2.6.2.4 Grade Cleanouts: PVC cleanout adaptor with countersunk, threaded brass plug. Wade W-8590-D plug. In sidewalks and other finished concrete, provide access cover frames with a non-tilting tractor cover. Wade W-7035-Z or equal.

2.6.2.5 Cleanouts in Paved Areas: Cast iron body, adjustable housing, ferrule with plug and round loose scoriated tractor cover. Wade W-8300-MF. Coordinate concrete depth at site with adjustable flange.

2.7 Floor Drains: Provide floor drains of size as indicated on drawings; and type, including features, as specified herein. Josam, Jay R. Smith, Wade, Zurn.

2.7.1 Floor Drains: Provide inside caulk bottom outlet or TY-Seal hub outlet with adaptor for cast iron trap installation and a 4" deep trap seal. Provide clamping rings for floors with membrane.

2.7.2 Strainer: Provide 5" satin-nickel bronze strainer.

2.7.3 Trap Primer Connection: Provide ½" trap primer tapping.

2.7.4 Funnel: Provide funnel where shown on the drawings.

2.7.5 Basis of Design: Wade Series 1100.

3 EXECUTION

3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 Piping Installation:

3.2.1 Install above grade soil and waste piping in accordance with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", and with Florida Building Code-Plumbing.

3.2.2 Install underground soil and waste pipes as indicated and in accordance with Florida Building Code-Plumbing. Lay underground piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

3.2.3 Install building soil and vent piping pitched to drain at minimum slope of ¼" per foot (2%) for piping smaller than 3", and 1/8" per foot (1%) for piping 3" and larger.

3.3 Install piping specialties in accordance with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors in accordance with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Installation of Cleanouts: Install in above ground piping and building drain piping as indicated, as required by Florida Building Code-Plumbing; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish.

3.5.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.

3.5.2 Install cleanouts to allow adequate clearance for rodding.

3.5.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.

3.5.4 Cleanouts to Grade: Provide an 18" x 18" x 8" thick concrete pad around the cleanout. Set the cleanout ferrule, adapter, or access cover frame in the concrete as required. The cleanout shall be extended to the finished grade. The concrete pad shall slope away from the cleanout in all directions approximately one inch. Cover pad with fill to finished grade.

3.5.5 Cleanouts in Paved Areas: Provide concrete pad similar to cleanout to grade and coordinate concrete depth at site with adjustable flange. Access cover frames are required.

3.6 Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

3.7 Vent Flashing Sleeves: Install on stack passing through roof, secure to stack flashing in accordance with manufacturer’s instructions. For metal roofs, sleeves and flashing are by Division-7.

3.8 Installation of Floor Drains: Install floor drains in accordance with manufacturer's written instructions and in locations indicated.

3.8.1 Coordinate flashing work with work of waterproofing and adjoining substrate work.

3.8.2 Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

3.8.3 Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

3.8.4 Position drains so that they are accessible and easy to maintain.

3.9 Connection of Trap Primers: Connect trap primers as indicated, and in accordance with manufacturer's installation instructions. Pitch piping towards drain trap, minimum of 1/8" per foot (1%). Adjust trap primer for proper flow.

3.10 Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Florida Building Code-Plumbing.

3.11 Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-15 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION

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SECTION 15430 - PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Requirements and Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of plumbing fixtures work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to Division-16 sections for field-installed electrical wiring required for plumbing fixtures; not work of this section.

1.5 Codes and Standards:

1.5.1 Plumbing Fixture Standards: Comply with applicable portions of Florida Building Code-Plumbing pertaining to materials and installation of plumbing fixtures.

1.5.2 ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.

1.5.3 PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.

1.5.4 UL Listing: Construct plumbing fixtures requiring electrical power in accordance with UL standards and provide UL-listing and label.

1.5.5 ARI Compliance: Construct and install water coolers in accordance with ARI Standard 1010 "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers", and provide Certification Symbol.

1.5.6 ANSI Compliance: Construct and install barrier-free plumbing fixtures in accordance with ANSI Standard A117.1 "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, furnished specialties and accessories; and installation instructions. Submit manufacturer's assembly-type drawings indicating dimensions, roughing-in requirements, required clearances, and methods of assembly of components and anchorages. The submittal shall be organized by “fixture number” and each fixture package shall be so identified. Each fixture package shall include all of the required fitting and trim, even if such devices are used for more than one fixture.

1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.

1.8 Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

2 PRODUCTS

2.1 General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide trim, carrier, seats, and valves as specified. Where not specified, provide products as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 Model Numbers: Basis of design model numbers of a particular manufacturer are listed in the fixture schedule as an aid to contractors. Where conflicts between the model number and the written description occur, the written description shall govern. Where acceptable manufacturers are listed, products are subject to compliance with requirements.

2.3 Materials:

2.3.1 Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.

2.3.2 All fixtures shall be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.

2.3.3 Where fittings, trim and accessories are exposed or semi-exposed provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

2.3.4 Stainless Steel Sheets: ASTM A 167, Type 302/304, hardest workable temper. Finish shall be No. 4, bright, directional polish on exposed surfaces.

2.3.5 Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C 554.

2.3.6 Synthetic Stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.

2.4 Plumbing Fittings, Trim and Accessories:

2.4.1 Faucets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality chrome-plated, cast-brass faucets, valves, or other dispensing devices, of type and size indicated, and as required to operate as indicated.

2.4.1.1 Aerators: Provide aerators of types approved by Health Department having jurisdiction.

2.4.1.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Chicago Faucet Co., Kohler Co., Speakman Co., T & S Brass and Bronze Works, Water Saver Faucet Co.

2.4.2 Stops: Provide chrome-plated brass, angle type, manual shutoff valves and 3/8" chrome-plated flexible supply pipes to permit fixture servicing without shutdown of water supply piping systems for all fixtures. Coordinate with fixture requirements.

2.4.2.1 Provide loose key stops.

2.4.2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn or approved equal.

2.4.3 Waste Outlets: Provide removable P-traps, drains, waste arms, tailpieces and wastes-to-wall where drains are indicated for direct connection to drainage system for all fixtures unless otherwise noted. Provide drains, tailpieces and waste arms where indirect drains are indicated. Waste outlets shall be full size of fixture drain connection.

2.4.3.1 Provide chrome-plated cast-brass P-traps and drains with cleanout.

2.4.3.2 P-traps, wastes and drains of all types shall be 17-gauge.

2.4.3.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Zurn, or approved equal.

2.4.4 Flush Valves: Provide quiet-flush, chrome-plated, cast-brass flush valves with vacuum breaker and screwdriver stop. Where handicap service is indicated, provide ADA compliant handles with the handle on the wide side of the stall.

2.4.4.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Sloan Valve Co. or Zurn.

2.4.5 Carriers: Provide cast-iron supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron or steel as indicated. Coordinate with specific fixture requirements and conditions of the project.

2.4.5.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Josam, Wade, Zurn, J.R. Smith.

2.4.6 Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

2.4.7 Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome-plated brass escutcheons with friction clips.

2.4.8 Comply with additional fixture requirements listed for each fixture and as required for a complete and functional system.

2.5 Water Closets:

2.5.1 General: Provide white china siphon jet type unless otherwise noted.

2.5.1.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.5.2 Fixture Seats: Provide white, heavy molded plastic fixture seats with stainless steel self-sustaining check hinges.

2.5.2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Bemis Mfg. Co., Beneke Corp., Church or Comfort Seats.

2.5.3 Water Closet Schedule:

WC-1 WATER CLOSET, FLOOR-MOUNT (STANDARD, MANUAL VALVE):

Vitreous china, 1.28 gallons per flush, elongated, high efficiency siphon jet, white, water saver bowl with 1-1/2" top spud. Exposed chrome plate flush valve, with screwdriver stop, vacuum breaker, quiet flush feature, with sweat solder kit and cast wall flange. Heavy molded plastic, white, elongated, open front seat less cover, with stainless steel, self-sustaining check hinges.

Water closet	Zurn Z5655-BWL
Valve	Zurn Z6000PL-HET
Seat Z5955SS-EL-STS	
Closet Bolt/Wax Ring Kit	Z5972-COMB

WC-2 WATER CLOSET, FLOOR-MOUNT (HANDICAP, MANUAL VALVE):

Vitreous china, 1.28 gallons per flush, elongated, high efficiency siphon jet, white, water saver bowl with 1-1/2" top spud, 17" high for handicapped. Exposed chrome plate flush valve, with screwdriver stop, vacuum breaker, quiet flush feature, with sweat solder kit and cast wall flange. Heavy molded plastic, white, elongated, open front seat less cover, with stainless steel, self-sustaining check hinges. Hold centerline flush valve assembly off finish wall for grab bar clearances, coordinate with Architectural drawings.

Water closet	Zurn Z5665BWL
Valve	Zurn Z6000PL-HET
Seat Z5955SS-EL-STS	
Closet Bolt/Wax Ring Kit	Z5972-COMB

2.6 Urinals:

2.6.1 General: Provide white china siphon jet wall hung type with ¾” top spud and 2" outlet unless otherwise noted. Provide short foot carrier with top and bottom hanger plates.

2.6.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.6.3 Urinal Schedule:

UR-1 URINAL, WALL-MOUNT (HANDICAP, MANUAL VALVE):

Vitreous china, 0.125 gallons per flush, siphon jet flush, 3/4" top spud, and 2" outlet urinal. Exposed chrome plated flush valve with screwdriver stop, vacuum breaker and quiet flush feature. Mount to satisfy ADA requirements, coordinate with Architectural drawings (toilet room elevations) for final mounting height. Furnish floor mounted single carrier with hanger plate, bearing plate, adjustable supporting rods, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge

anchors, complete with stainless steel clip, washer and threaded nut, conforming to federal spec. FF-S-325.

Urinal	Zurn Z5730
Valve	Zurn Z6003PL-ULF
Urinal Flange Kit	Zurn Z5976-URINAL
Carrier	Zurn Z-1222
Base Anchorage	B-Line Anchors AWA-50-375

2.7 Lavatories:

2.7.1 General: Provide white china lavatories.

2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Crane, Kohler, or Zurn.

2.7.3 Lavatory Schedule:

L-1 LAVATORY, WALL-MOUNT (STANDARD):

Vitreous china 20" x 18", color “white”, center hole setting, front overflow, for concealed arm support. Furnish floor-mounted single carrier with concealed arms, leveling and securing screws, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge anchors, complete with stainless steel clip, washer and threaded nut, conforming to federal spec. FF-S-325. Provide chrome plated angle stop to wall with chrome plated 3/8" flexible supply and loose key operator, integral perforated cast brass strainer with 1-1/4" tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. Polished chrome plated cast brass single water metering faucet with cover plate, aerator outlet and push button. Provide rigid plastic vandal-guard lavatory shield assembly designed for specific lavatory.

Lavatory	Zurn Z5341-PED
Faucet	Zurn Z-86300
Supply w/stop	Zurn Z-8800LRLK-PC
P-Trap	Zurn Z-8700PC
Strainer/tailpiece	Zurn Z-8743-PC
Vandal-Guard	Zurn Z6900-VG
Carrier	Zurn Z-1231
Base Anchorage	B-Line Anchors AWA-50-375

L-2 LAVATORY, WALL-MOUNT (HANDICAP):

Vitreous china 20" x 18", color “white”, center hole setting, front overflow, for concealed arm support. Furnish floor-mounted single carrier with concealed arms, leveling and securing screws, structural uprights and block bases, secure base to floor for rigid connection with 1/2" x 3-3/4" threaded zinc plated steel heavy duty wedge anchors, complete with stainless steel clip, washer and threaded nut. Provide chrome plated angle stop to wall with chrome plated 3/8" flexible supply and loose key operator, integral perforated cast brass strainer with elbow and 1-1/4" offset tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. Polished chrome plated cast brass single water metering faucet with cover plate, aerator outlet and push button. Provide rigid plastic vandal-guard lavatory shield assembly designed for the lavatory. Lavatory shall be mounted with a clearance of at least 28" from

floor to bottom of the apron. Knee and toe clearances shall be as follows: 27" clear height shall be provided from finished floor to a point on underside of bowl 8" in from front apron. Toe clearance shall be a minimum height of 9" under P-trap and supplies or stops. See Architectural drawings for final mounting height.

Lavatory	Zurn Z5341
Faucet	Zurn Z-86300
Supply w/stop	Zurn Z8800LRLK-PC
P-Trap	Zurn Z8700-PC
Strainer/tailpiece	Zurn Z8746
Vandal-Guard	Zurn Z6900-VG
Aerator	Zurn -5M
Carrier	Zurn Z-1231
Base Anchorage	B-Line Anchors AWA-50-375

2.8 Electric Water Coolers:

2.8.1 General: Provide self-contained electric water cooler with entire water system free of lead. All joints shall be made using silver solder. Units shall be complete with an air-cooled refrigeration system consisting of a hermetic compressor, cooler, pre-cooler, condenser fan, thermostat safety controls and all other related devices. The unit shall have a capacity of 8 gallons per hour. The cabinet shall be stainless steel with vermin proof insulation. The top shall be fabricated of stainless steel with a No. 4 finish. Where handicap units are indicated, the bubbler and fountain shall be ADA compliant.

2.8.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay Mfg. Co., Halsey Taylor Div., Haws Drinking Faucet Co., Sunroc, Oasis.

2.8.3 Electric Water Cooler Schedule:

EWC-1 ELECTRIC WATER COOLER (DUAL PURPOSE/TWO LEVELS/BOTTLE STATION):

Wall mount, dual-purpose unit, self-contained electric water cooler with sensor-activated bottle filling station. Furnish floor mounted two levels double carrier with bearing plate, hangar plate, adjustable supporting rods, structural uprights and block bases, secure to floor with ½" bolts and anchors. Unit to be complete with hermetic air cooled refrigeration system, cooler pre-cooler, thermostat, safety controls, condenser fan motor, silver ion antimicrobial protection on key plastic components, flexi-guard safety bubbler, vermin proof insulation, heavy gauge steel cabinet, moisture resistant finish, quiet operation. Top of cooler shall be No. 3 satin finish stainless steel. Cooler capacity shall be 8.0 gph, laminar flow, visual kilter monitor, cooling 80-degree F water to 50 degree F. Provide one-year warranty on entire cooler. Provide chrome plated stop to wall with chrome plated 3/8" flexible supply. Provide 1-1/2" chrome plated 17 gauge cast brass P-trap with cleanout. Chrome plated loose key angle stop to wall with 3/8" chrome plated flexible hot and cold water supplies. 115V/60hz, single phase, 5 full load amps, 370 rated watts, hermetically-sealed reciprocating compressor. Verify final location and mounting height with Architectural drawings. Finish to be selected by Architect. Certified to NSF/ANSI 42, 53, 61, & 372. UL 399 requirements.

EWC	Elkay LZSTL8WSSP
Trap	Zurn Z-8702-PC

Supplies	Zurn Z-8800LK
Carrier	Z1225 BL

2.9 Mop Receptors:

2.9.1 General: Provide one piece mop receptors with 3" integral stainless steel grid drain. Provide wall-mounted faucet with arm handles, vacuum breaker, stops, hose connection and hose bracket. Provide 30" hose.

2.9.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Stern-Williams Co., or Acorn.

2.9.3 Mop Receptor Schedule:

MR-1 SERVICE SINK (FLOOR TYPE):

24” x 24” x 12” deep, floor mount, terrazzo with 20 gauge stainless steel integral cast cap, 3” cast brass outlet drain with stainless steel strainer. Rough chrome plated 8” faucet with top brace, straight lever handles, swivel inlets, bucket hook, vacuum breaker, stops and hose end. Chrome plated loose key angle stop to wall with 3/8" chrome plated flexible hot and cold water supplies.

Sink	Acorn TSH-24
Faucet	Zurn Z843 M1 RC
Supply	Zurn Z8800-LRLK

2.10 Stainless Steel Sinks:

2.10.1 General: Provide Type 304, 18 gauge self-rimming stainless steel back ledge with No. 4 finish . Provide sound deadening material on the sides and bottom of the sink. Provide grid drain or strainer with removable crumb cup and stopper as indicated.

2.10.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Elkay, Just

2.10.3 Stainless Steel Sink Schedule:

SK-1 SINGLE COMPARTMENT STAINLESS STEEL SINK:

19" x 19" x 7-1/2" deep (bowl is 16x13-1/2x7-1/2), type 304, 18 gauge, [center hole, 4” or 8” centers], self rimming single compartment, (18-8) nickel bearing stainless steel, back ledge sink with satin finish and sound deadening material on sides and bottom of sink. Provide polished chrome plated top mount swing gooseneck spout and vacuum breaker, straight lever handles, pressure compensating aerator strainer with removable crumb cup and stopper, 1-1/2 tailpiece, chrome plated 17 gauge cast brass P-trap with cleanout and tube waste to wall. Chrome plated loose key angle stop to wall, with 3/8" chrome plated flexible hot and cold water supplies. Sink drillings shall accommodate fitting installation, only, no other capped openings will be allowed. P-trap and angle valve assemblies shall be insulated with fully molded insulation kit, and light gray color with 3-piece interlocking rap assembly and 2-piece interlocking angle valve assembly. Fasteners shall be nylon-type supplied with kit

Sink	Elkay LR-1919
Faucet	Zurn Z-871 B1
Strainer	Elkay LK-35
Supplies	Zurn Z-8800-LR_LK
P-trap	Zurn Z-8702 PC
Insulation kit	Zurn Z8946-3-NT

2.11 Water Heaters:

2.11.1 Electric Water Heaters:

2.11.2 Accessories: VB, relief, pan, stand, etc.

2.11.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Ruud, Rheem, Mor-Flo, State, A.O. Smith.

2.11.4 Water Heater Schedule:

EWH-1 ELECTRIC WATER HEATER:

ASHRAE Standard 90, glass lined tank Suitable for 150 psi working pressure, 300-psi test. Finish of durable high gloss baked enamel. Blanket glass fiber insulation over entire tank. ASME pressure and temperature relief valve. Water heater shall be acceptable for commercial application by manufacturer. Provide 3 full year warranty, snap action automatic surface mounted thermostats, immersion type heating elements and magnesium anode rod. Provide unit mounted disconnect switch. Provide precharged expansion tank, outer steel shell (flexible diaphragm type), on cold water inlet side of water heater for thermal expansion control, tank volume in gallons shall be of sufficient size to accommodate water heater size in gallons. Provide galvanized steel drip pan.

Water Heater	A. O. Smith DEN-30
Vacuum Relief	Watts 36A
Expansion Tank	Amtrol “Therm-X-Trol”

2.12 Thermostatic Mixing Valves:

2.12.1 General:

2.12.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item.

2.12.3 Thermostatic Mixing Valve Schedule:

MV-1 WATER MIXING VALVE (THERMOSTATIC MIXING):

Exposed rough bronze finish Thermostatic water mixing valve, factory assembled, 1 GPM minimum flow capacity, complete with inlet check stops and manifold piping, outlet control/shutoff color code dial thermometer limit stop set for 120 degree F (maximum).

Exposed Mixing Valve	Lawler 6125 (84008-09) (Rough Bronze)

2.13 Miscellaneous Fixtures:

2.13.1 General:

2.13.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item.

2.13.3 Miscellaneous Fixture Schedule:

FS-1 FLOOR SINK:

8" x 8" x 6" deep, enameled cast iron (inside only enameled) with chrome plated brass beehive strainer (less grate), 3" outlet connection. Provide running trap under floor with cleanout flush to floor finish material, coordinate with architectural finish schedule.

Floor Sink Zurn Z-1910

FS-2 FLOOR SINK:

12" x 12" x 10" deep, enameled cast iron (inside only enameled) with chrome plated brass beehive strainer (less grate), 3" outlet connection. Provide running trap under floor with cleanout flush to floor finish material, coordinate with architectural finish schedule.

Floor Sink Zurn Z-1902

CP-1 CIRCULATOR PUMP (INLINE TYPE):

Self-adjusting high-efficiency circulator made of engineered polymer impeller, stainless steel shaft, metal impregnated carbon, and cast iron cataphoresis coated casting. A 1/4 HP ECM permanent magnet motor and electrical characteristics are 115v/1 phase, 47-63 hz., with 3/4" to 1-1/2" connections, maximum operating pressure of 145 PSI, five operating modes (automatic, proportional pressure, constant pressure, programmed speed, and night setback) UL standard 778 and CSA standard 22.2 no. 108. Pump shall run off of DDC time of day. Temperature aquastat, maintains water temperature between 125ºF and 145ºF. Circuit Setter calibrated balance valve, lead-free brass, with 1/4" NPT tapped drain port, memory stop feature, set at 0.5 gpm with 1' of head. Provide Circuit Solver a self-acting thermostatic recirculation valve set at 115ºF.

Circulator	TACO VR3452-FC1A00
Aquastat	TACO 563-2
Circuit setter	Xylem CB-1S LF
Recirculation Valve	Circuit Solver CS-1/2-115

CP-2 CIRCULATOR PUMP (INLINE TYPE):

Self-adjusting high-efficiency circulator made of engineered polymer impeller, stainless steel shaft, metal impregnated carbon, and cast iron cataphoresis coated casting. A 1/4 HP ECM permanent magnet motor and electrical characteristics are 115v/1 phase, 47-63 hz., with 3/4" to 1-1/2" connections, maximum operating pressure of 145 PSI, five operating modes (automatic, proportional pressure, constant pressure, programmed speed, and night setback) UL standard 778 and CSA standard 22.2 no. 108. Digital timer with circulator programming.

Temperature aquastat, maintains water temperature between 95ºF and 115ºF. Circuit Setter calibrated balance valve, lead-free brass, with 1/4” NPT tapped drain port, memory stop feature, set at 0.5 gpm with 1’ of head. Provide Circuit Solver a self-acting thermostatic recirculation valve set at 85ºF.

Circulator TACO VR3452-FC1A00	
Timer	TACO 265-3
Aquastat	TACO 563-2
Circuit setter	Xylem CB-1/2S LF
Recirculation Valve	Circuit Solver CS-1/2-85

UB-1 WALL BOX WITH SHUT-OFF VALVE: (ICE MAKER)

Recessed metal wall box constructed and suitable for fire rated partitions, complete with factory installed shank valve with 1/4" O.D. copper outlet tested @ 100 P.S.I. Provide approximately 5'-0" of 1/4" O.D. soft copper tubing with compression fitting in tight coil. Anchor box to wall structure. Verify location and mounting height with Architectural drawings or mount to manufacturer's recommendations.

Wall box	IPS Corporation MIB-1

3 EXECUTION

3.1 Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Install plumbing fixtures of types indicated where shown and at indicated heights. Install in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Install in accordance with ADA and applicable handicap code requirements. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of Florida Building Code-Plumbing pertaining to installation of plumbing fixtures. Furnish templates for cut-outs in countertops. Coordinate exact fixture locations with countertop shop drawings.

3.3 Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement. Mount at heights shown on the drawings. Fixture heights are floor-to-rim distance. Fitting heights are to centerline.

3.4 Install stop valve in water supply to each fixture.

3.5 After fixtures are set, the crack between the fixture and wall shall be caulked with DAP silicone-based caulking, or approved equal.

3.6 Protect installed fixtures from damage during remainder of construction period.

3.7 Upon completion of installation of plumbing fixtures and after units are water pressurized, test

fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.8 Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

3.9 Clean plumbing fixtures, trim, aerators, and strainers of dirt and debris upon completion of installation.

3.10 Adjust water pressure at drinking fountains, faucets, shower valves, and flush valves to provide proper flow stream and specified gpm.

3.11 Adjust or replace washers to prevent leaks at faucets and stops.

END OF SECTION

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SECTION 15502 - CHILLED WATER PREINSULATED PIPING

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of underground preinsulated piping system work, is indicated on drawings and by requirements of this section.

1.4 Verify all existing conditions prior to bidding. The Contractor shall include in his price for the underground preinsulated piping system sufficient elbows, offsets, and pipe to provide for unforeseen conditions. The drawings do not show the exact location or inverts of all existing utilities, conditions, etc. However, the contractor's bid shall include sufficient labor and material costs to allow for these conditions without causing additional cost for the Owner or delays in the project schedule.

1.5 Refer to other Division-15 sections for field-applied insulation, manholes, valves, hydronic specialties, and expansion compensation.

1.6 Codes and Standards: Fabricate and install piping in accordance with ASME B31.9 "Building Services Piping".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for systems, including: carrier pipe, jacket, insulation, materials and products.

1.7.2 Shop Drawings: Submit scaled layout drawings of underground preinsulated piping system including, but not necessarily limited to, pipe sizes, location, offsets, connections, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Indicate interface and spatial relationship between piping and manholes or valve boxes. Coordinate with all other site utilities and all existing conditions. Field verify final location of pipe prior to submittal of layout drawings and fabrication. Shop drawings shall indicate the existing conditions. Probe or excavate as required.

1.8 O&M Data Submittals: Submit a copy of approval submittals for preinsulated piping system materials and products. Include this data in O&M manual.

2 PRODUCTS

2.1 General: Provide factory-fabricated piping system, jacket, and insulation products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by manufacturer to comply with installation requirements. Provide materials and products complying with ASME B31.9 Code for Building Services Piping where applicable, base pressure rating on piping systems maximum design pressures. Provide fittings and materials which match pipe materials used in piping systems. Provide rolled product such that continuous lengths of pipe are used between buildings.

2.2 Chilled Water Carrier Pipe and Fittings: Carrier pipe shall be high density polyethylene (HDPE), conforming to ASTM D-3350 and the specification standards listed in this section. Pipe and fittings shall be manufactured from extra high molecular weight polyethylene compound and fabricated to Standard Dimensional Ration (SDR) wall thickness in standard IPS sizes. Underground pipe shall be a maximum of SDR-11. Pipe shall be suitable for temperatures up to 140ºF at 80 psi and 74ºF at 160 psi.

2.3 Outer Jacket:

2.3.1 Jacket: The outer protective jacket shall be corrugated seamless polyethylene completely encompassing and protecting the insulation from moisture and damage, designed for H-20 loading at a burial depth of 2-ft minimum. Jacketing shall be extruded, black, high density polyethylene (HDPE), having a minimum wall thickness of 0.12” for 2.5” pipe.

2.3.2 Insulation: Minimum 1.05” thick chilled water (4.0” carrier pipe) and 1.34" thick hot water (2.5” carrier pipe) closed cell polyurethane foam with maximum K = 0.16 and shall conform to ASTM C-591. Insulation shall be rigid, 90-95% closed cell polyurethane with a 2.0 to 3.0 pounds per cubic foot density.

2.3.3 Insulation shall be complete through all piping and fittings. No exposed insulation will be accepted above or below ground. All ends of insulated pipe shall be sealed with polyethylene or mastic end seals.

2.4 Acceptable Manufacturers: Subject to compliance with requirements, provide preinsulated piping systems of one of the following: Thermacore, Ricwil, Rovanco, Perma Pipe, Aquatherm.

3 EXECUTION

3.1 Inspection: Examine areas and conditions under which products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Underground Piping: Install in accordance with Division 15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings" and "Excavation and Backfill". Route piping to eliminate field joints under the parking lot.

3.3 Testing: Carrier pipe shall be pressure tested hydrostatically in accordance with Division-15 Basic Mechanical Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems" after completing and prior to jacket closure. The Contractor shall provide all necessary equipment for the testing.

END OF SECTION

SECTION 15505 - CHILLED WATER SYSTEMS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Refer to other Division-15 sections for insulation of hydronic piping; not work of this section.

1.4 Refer to other Division-15 sections for hydronic specialties; not work of this section.

1.5 Refer to other Division-15 sections for HVAC air handling units; not work of this section.

1.6 Refer to other Division-15 sections for testing, adjusting, and balancing of hydronic piping systems; not work of this section.

1.7 Codes and Standards: Fabricate and install hydronic piping in accordance with ASME B31.9 "Building Services Piping."

1.8 Approval Submittals:

1.8.1 Product Data: Submit manufacturer's product data for:

Valves
Meters and Gauges

1.8.2 Shop Drawings: Submit scaled layout drawings of piping systems in mechanical rooms and manholes including, but not necessarily limited to, pipe sizes, location, offsets, connections, elevations, and hydronic specialties. Indicate interface and spatial relationship between piping and equipment. Coordinate with all other trades work and existing conditions. Field verify final location of pipe prior to submittal of layout drawings and fabrication.

1.9 Test Reports and Verification Submittals:

Submit welder's certificates.
Submit water treatment test report.

1.10 O&M Manual Submittals: Submit a copy of approval submittals. Include this data in O&M manual.

2 PRODUCTS

2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ASME B31.9 Code for Building Services Piping where applicable, base pressure rating on hydronic piping systems maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in hydronic piping systems. Where more than one

type of materials or products are indicated, selection is Installer's option.

2.2 Basic Identification: Provide identification complying with Division-15 Basic Mechanical Materials and Methods section "Mechanical Identification."

2.3 Basic Pipes and Pipe Fittings: Provide pipes and pipe fittings complying with Division-15 Basic Mechanical Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:

2.3.1 Pipe Size 2" and Smaller: Black steel pipe; Schedule 40; Class 125 cast-iron fittings with threaded joints.

2.3.2 Tube Size 3" and Smaller: Copper tube; Type L, hard-drawn temper; wrought-copper fittings with soldered joints.

2.3.3 Pipe Size 2½" and Larger: Black steel pipe; Schedule 40; wrought-steel buttwelding fittings with welded joints.

2.4 Basic Piping Specialties: Provide piping specialties complying with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties."

2.5 Basic Supports and Anchors: Provide supports and anchors complying with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors."

2.6 Basic Valves: Provide valves complying with Division-15 Basic Materials and Methods section “Valves” and the following list:

2.6.1 Standard Service Sectional Valves: Type BF1, BF2, BF3, BF4.

2.6.2 Standard Service Shutoff Valves: Type BA1.

2.6.3 Standard Service Drain Valves: Type BA1.

2.6.4 Standard Service Terminal Runout Valves (Copper Runouts): Type BA2.

2.7 Basic Meters and Gauges: Provide meters and gauges complying with Division-15 Basic Mechanical Materials and Methods section "Meters and Gauges", in accordance with the following listing:

Temperature gauges and fittings.
Pressure gauges and fittings.

3 EXECUTION

3.1 General: Examine areas and conditions under which hydronic piping systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation of Hydronic Piping:

3.2.1 General: Install hydronic piping in accordance with Division-15 Basic Mechanical Materials

and Methods section "Pipes and Pipe Fittings".

3.2.2 Install eccentric reducers where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush. Do not use bushings.

3.2.3 Install piping with 1/32" per foot (¼%) upward slope in direction of flow, or as indicated on the drawings. The intent is to install piping sloped to drains at low points in the system for a drainable system.

3.2.4 Connect branch-feed piping to mains at horizontal center line of mains, connect run-out piping to branches at horizontal center line of branches.

3.2.5 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.

3.3 Install piping specialties in accordance with Division-15 Basic Mechanical Materials and Methods section "Piping Specialties".

3.4 Install supports and anchors in accordance with Division-15 Basic Mechanical Materials and Methods section "Supports and Anchors".

3.5 Install valves in accordance with Division-15 Basic Mechanical Materials and Methods section "Valves".

3.5.1 Shutoff Valves: Install on inlet and outlet of each mechanical equipment item, and on inlet and outlet of each hydronic terminal, and elsewhere as indicated.

3.5.2 Drain Valves: Install on each mechanical equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere where indicated or required to completely drain hydronic piping system.

3.6 Install meters and gauges in accordance with Division-15 Basic Materials and Methods section "Meters and Gauges".

3.7 Equipment Connections:

3.7.1 General: Connect hydronic piping system to mechanical equipment as indicated on the drawings, and comply with equipment manufacturer's instructions where not otherwise indicated. Install shutoff valve and union on supply and return and a drain valve on the drain connection. Connections between dissimilar metals shall be made with dielectric devices.

3.7.2 Hydronic Terminals: Install hydronic terminals with shutoff valves, unions and related devices as shown on the drawings. Install air vent valve on element in accordance with manufacturer's instructions. Locate valves and balancing cocks for ease of maintenance. Where indicated, install automatic temperature control valve with unions on return line between coil and shutoff valve.

3.8 Pipe drains from pump glands, relief valves, strainers, etc., to spill over an open sight drain, floor drain or other acceptable discharge point, and terminate with a plain end (unthreaded pipe) 6" above the drain. Rigidly support all drains.

3.9 Locate and coordinate installation of access doors for all valves and devices in accordance with Division-15 Basic Mechanical Materials and Methods section “Access Doors”.

3.10 Testing, Cleaning, Flushing, and Inspecting: Test, clean, flush, and inspect hydronic piping systems in accordance with requirements of Division-15 Basic Mechanical Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems."

3.11 Chemical Treatment: Refill hydronic piping systems. New piping shall be flushed, cleaned in accordance with the project manual and pre-treated as recommended by U.S. Water, the the current Escambia County School District water treatment vendor for the Escambia Westgate Center. Maintain water treatment throughout construction until final acceptance of the project. Contractor shall purchase the necessary chemicals from U.S. Water, and flushing, cleaning, and pre-treatment shall be coordinated with the US Water representative. Submit test report. Contact David Causey at: (310) 561-0705

END OF SECTION

SECTION 15610 - CUSTOM AIR HANDLING UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air handling unit work is indicated on drawings, and schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for field-applied insulation to air handling units.

1.5 Refer to other Division-15 sections for condensate and chilled water piping required in conjunction with air handling units.

1.6 Refer to other Division - 15 Sections for HVAC equipment to be included as part of the penthouse units or air handling units such as DDC Controls, Variable Frequency Drives, and Hydronic Specialties.

1.7 Refer to Division-16 sections for the following work; not work of this section.

1.7.1 Power supply wiring from power source to power connection on unit. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory installed by manufacturer.

1.8 Codes and Standards:

1.8.1 AMCA Compliance: Test and rate air handling units in accordance with AMCA standards.

1.8.2 ARI Compliance: Test and rate air handling units in accordance with ARI 430 "Standard for Central-Station Air Handling Units", and ARI 410 for coils, display certification symbol on units of certified models.

1.8.3 NFPA Compliance: Provide air handling unit internal insulation, adhesives, and coatings having flame spread rating not over 25 and smoke developed rating no higher than 50; and complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems."

1.8.4 UL and NEMA Compliance: Provide electrical components required as part of air handling units, which have been listed and labeled by UL and comply with NEMA Standards.

1.8.5 NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data as follows showing dimensions, weights, capacities, certified ratings, fan performance with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, and installation instructions.

Submit assembly-type drawings showing unit dimensions, weight loadings, required clearances, construction details, and field connection details.

Air handling unit components including casings, fans, coils and all related equipment.
Vibration Isolation

1.9.2 Shop Drawings: Submit shop drawings showing the actual installation of each air handling unit, in plan and section. Show coil access, filter access, motor access, controls access and access to any other components requiring service. Show coordination with all related structural components of the building and show all unit supports. Show relationship to drains and other equipment. Show every electrical device and control panel with code-required service clearance clearly marked.

Units mounted in mechanical rooms.

1.10 O&M Data Submittals:

1.10.1 Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to air handling units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field installed.

1.10.2 Maintenance Data: Submit a copy of approval submittals. Submit maintenance instructions, including instructions for lubrication, filter replacement, motor and drive replacement, and spare parts lists. Include these data and wiring diagrams in O&M manuals.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air handling units of one of the following:

Daikin
Thermal
Temtrol

2.2 General:

2.2.1 Factory fabricated air handling units shall be constructed of solid steel, formed outer panels secured to an integral steel frame or to a bolted steel frame. Outer panels shall be removable without affecting the structural integrity of the units. All units shall come complete with a structural steel base around the entire perimeter. Construction shall result in a leakage rate of less than 1% of rated flow at maximum operating pressure.

2.2.2 Multiple sectioned units shall be as a single factory assembled piece (except where shipping limitations prevent) demounted into modular sections in the field by Contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by Contractor.

2.2.3 All units shall be UL or ETL listed.

2.2.4 All coil connections, access doors and drains shall be coordinated with field piping and electrical connections.

2.2.5 Unit exterior dimensions shall be the size as shown on the drawings.

2.3 Testing:

2.3.1 The unit manufacturer shall provide a factory leak test on all units at 8 inches static pressure. Cabinet leakage shall not exceed leak class 6 per ASHRAE 111 at 8 inches w.g. Specified air leakage shall be obtained without the use of caulk at normally removed access panels. Total estimated air leakage shall be reported for each unit in CFM, as a percentage of supply air, and as an ASHRAE 111 Leakage Class.

2.3.2 Fan shall be factory balanced to limit vibration at operating speed to the values shown in the following table. Measure vibration in all three planes. AHU manufacturer shall provide vibration test results.

2.4 Unit Base / Framework::

2.4.1 Unit base frame shall be structural steel cross members. The base shall include “Double Bottom” insulate floor. Base frames shall be fitted with lifting lugs at the corners of the unit or section (if demounted). Floor panels shall be double-wall construction and designed to support a 250 lb load during maintenance activities and shall deflect no more than 0.0042” per inch of panel span (L/240).

2.5 Exterior Casing:

2.5.1 The air handling unit casing shall be 2” thick double wall construction of the “no-through-metal” design. The casing structure shall incorporate insulating thermal breaks as required so that, when fully assembled, there exists no path of continuous unbroken metal to metal conduction from inner to outer surfaces. Provide required structural frame and casing to withstand 5" static pressure. Panels shall be gasketed and secured to the frame with screws. Outer panels shall be constructed from 18 gauge G-60 galvanized steel. Provide support system for architectural finish panels. Architectural finish panels are not a part of Division-15 work. The exterior panels shall be coated with a painting system designed for long term corrosion.

The paint shall meet or exceed the following criteria:

(ASTM B-117) salt spray resistance 5% fog at 95 degrees F. Passes 750 hr.
(ASTM D-2247) humidity resistance 100% salt at 95 degrees F. Passes 1,000 hr.

2.6 Unit Casing Insulation: Insulation shall not be disturbed if panels are removed. Insulation shall be secured to the entire panel with mechanical and adhesive over the entire panel surface. Entire unit to be insulated with 2" thick insulation. The insulation shall have an effective thermal the resistance value of R13, minimum. Insulation shall fill panels and external structural frame members completely in all direction such that no voids exist. Panel insulation shall comply with NFPA 90A.

2.7 Liners: The units shall be double wall construction and include a 20 gauge solid stainless steel liner in the entire unit except for supply fan section. The liner in the supply fan section shall be perforated galvanized steel construction. Insulation facing perforated inner wall shall be covered by a Mylar or Tedlar film with spacers to preserve the acoustical properties of the assembly.

2.8 Condensate Pan: Condensate drain pan shall be 16 gauge Type 304 stainless steel. All pans shall be insulated “Double Bottom” construction with welded corners. The drain shall be

sloped in two planes for complete drainage with no standing water in the unit. Drain connections shall be standard 1¼" NPT connection. Drain pans shall be provided under all cooling unit sections.

2.9 Access Doors: The unit shall be equipped with 2" double wall insulated, hinged access doors of the same construction as the interior and exterior wall panels. Doors shall be located upstream and downstream of all coils and in all filter, access plenum and fan sections and access to major components. The fan section door shall be large enough to allow the removal of the fan wheel and motor without disassembly of the unit casing. The door frame shall incorporate a built in thermal break barrier along with a gasket around the entire perimeter of the door. The door shall be hinged with minimum of two six inch long stainless steel piano-type hinges. There shall be two heavy duty Ventlok (260/310) handles (or equal) per door. Provide an ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors. Operating tool shall be chained to each unit with tamper resistant fasteners within reach of the safety latch. All doors to have windows where shown. All doors to be 60" high when sufficient unit height is available, or maximum height allowed by the unit height.

2.10 Fans: Provide direct drive fans of type and class as specified on the schedule. Fan shafts shall be solid steel, coated with a rust-inhibiting coating, and properly designed so that fan shaft does not pass through first critical speed as unit comes up to rated RPM. All fans shall be statically and dynamically tested by the manufacturer for vibration and alignment as an assembly at the operating RPM to meet design specifications. Fans controlled by variable frequency drives shall be statically and dynamically tested for vibration and alignment at speeds between 25% and 100% of design RPM. Fan wheels shall be keyed to fan shafts to prevent slipping.

2.11 Motors: Provide high efficiency motor. Provide motors suitable for inverter duty.

2.11.1 Variable Frequency Drives shall be furnished by the Digital Controls Contractor.

2.12 Coils:

2.12.1 Coil sections shall be double wall with 304 stainless steel inner liner.

2.12.2 All coil assemblies shall be tested under water at 315 psig and performance shall be certified under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be as noted on a coil computer printout.

2.12.3 All coil assemblies shall be factory coated with 5000 hr salt spray finish. Coating shall be UV resistant.

2.12.4 Type WC (water coils) shall be constructed of seamless copper tubing mechanically expanded into fin collars. Fins shall be the die formed plate type. Headers shall be seamless copper with die formed tube holes. Connections shall be male pipe thread (MPT) Schedule 40 red brass.

Vents and drains (1/8)" shall be provided for complete coil drainage. Coils shall be suitable for 250 psig working pressure. Intermediate tube supports shall be supplied on coils over 44" fin length with an additional support every 42" multiple thereafter. Coils shall have 5/8" o.d. x .035" wall copper tubes, .010" aluminum fins and 16 gauge Type 304 stainless steel casing. Coil tracks and supports shall be fabricated of Type stainless steel.

2.12.5 Provide multiple sections of coils split vertically and horizontally. Coil length shall not require more than 60" of clear space in front of unit for removing coil. Safe off all spaces between

coils to prevent air from bypassing coils.

2.12.6 Provide intermediate stainless steel drain pans beneath each section of cooling coil above bottom section. Provide a drain tube from each intermediate pan down to the base drain pan. Intermediate drain pans shall extend a minimum of 8" past the downstream face of coil.

2.12.7 Insulate all piping within the AHU in accordance with Division 15 section "Insulation for HVAC Equipment and Piping". Repair all cracks in insulation or covering at site after unit has been set. Piping and hydronic devices as well as piping insulation for all units shall be completed in the field.

2.13 Filter Boxes: Provide boxes to accommodate filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the units. Side service filter sections shall include hinged access doors. Internal safing shall be provided by the manufacturer as required to prevent air bypass around the filters.

2.13.1 Filter Gauge: Each filter bank shall be furnished with one (1) Magnehelic filter gauge (Dwyer Series 2000).

2.14 Ducted connection: Provide ductwork connection of sizes shown on the drawings.

2.15 Lighting: Provide vapor-proof light fixtures in all accessible sections. Factory mounted and wired to an external service switch.

2.16 Drains: Provide a capped washdown drain in each coil section.

2.17 Vibration Isolation: Provide Type EM5 Vibration Isolation.

2.18 UVC Lights General: Provide factory mounted and wired UVC light system. UVC Light system shall be wired to a switched junction box on the front of the unit at the factory. Provide door interlocking safety switch to turn off light when access door is opened.

2.18.1 UVC Lights: Provide factory assembled emitter and fixture consisting of housing, power source, reflector, Emitter sockets, and emitter. The housing shall be constructed of 304 stainless steel with heavy gage reflector, specular finished aluminum alloy with approximately 85% reflectance at 254 nm wavelength. Provide ½" conduit openings on each end to facilitate coupling and wiring fixture to fixture. The power source shall be a Class P2, electronic, rapid start type with a power factor greater than 0.95 and a power conversion of greater than 75%. The power supply shall include RF and EMI suppression and be designed to maximize photon production, irradiance, and reliability in cold or moving airstreams of 35-170F, 100% RH and up to 2000 FPM velocity. The fixture shall be 115V/60 hz. Emitter sockets shall be medium bi-pin, double click safety, twist lock type, constructed of UVC-resistant polycarbonate. Emitter tubes shall be very high output, hot cathode, T5 diameter, medium bi-pin type that produces broadband UVC of 250-260 nm at 2000 FPM velocity and air temperatures of 35-170F. It shall produce no ozone or other secondary contaminants. The unit shall be tested by an independent test laboratory in accordance with IES Lighting Handbook, 1981 and verified through independent testing to provide output per 1" arc length of not less than 10 uW/cm2 at 1 meter in a 400 FPM airstream at 45F. Units shall comply with UL Standard 1995 for use in HVAC equipment and carry the UL and ULC labels.

2.18.2 UVC Service Contract: Provide the services of a factory-trained service technician to perform start-up and subsequent inspection of fixtures and lamps on a semi-annual basis for a period of three (3) years. Each service call shall verify the following: access door interlocks are functional, all UVC emitters are functioning, UVC intensity at coil leading edge is within

manufacturer's guidelines. On an annual basis (or sooner as recommended by the manufacturer), the UVC tubes shall be replaced with tubes furnished in the service contract. After each service call, the technician shall submit a written report to the School District maintenance department documenting the above testing and proper operation of the UVC equipment including intensity readings.

2.18.3 UVC Equipment Warranty: The three year service contract specified shall also include equipment parts and labor warranty covering the complete UVC assembly including the fixtures, bulbs, and power supply for a period of three years from the date of start-up. The warranty does not cover normal emitter effectiveness loss due to aging.

3 EXECUTION

3.1 Examine areas and conditions under which air handling units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install air handling units where indicated, in accordance with equipment manufacturer's published installation instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes. The work of this section includes all equipment necessary for a complete, packaged system, including work and equipment specified in other Division 15 sections.

3.3 Coordination: Coordinate with other work, including architectural panels, ductwork, floor construction and piping, as necessary to interface installation of air handling units with other work.

3.4 Access: Provide access space around air handling units for service as indicated, but in no case less than that recommended by manufacturer.

3.5 Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to electrical Installer. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.

3.6 Piping Connections: Refer to Division-15 HVAC sections. Provide piping, valves, accessories, gauges and supports as indicated. Eliminate strain on coil headers. Provide trapped, insulated, DWV copper condensate drain piping full size from the drain connection as shown and extend independently to disposal point as part of this section's work. Provide individual trap from each drain.

3.7 Duct Connections: Refer to Division-15 Air Distribution sections. Provide ductwork, accessories, and flexible connections as indicated.

3.8 Vibration Isolation: Install in accordance with requirements of Section 15135 Vibration Isolation.

3.9 Brush out fins on all coils.

3.10 Testing: Upon completion of installation, start-up and operate equipment to demonstrate capability and compliance with requirements. Install final, fixed sheave package. Field correct malfunctioning units, then retest to demonstrate compliance.

3.11 Provide one spare set of belts for each belt-driven fan, obtain receipt from Owner that belts have been received

3.12 Install new filters (prefilters and final filters as applicable) at final completion. Provide two spare sets of filters to owner at final completion

END OF SECTION

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SECTION 15715 - DUCTLESS SPLIT SYSTEM AIR CONDITIONING UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Refer to other Division-15 sections for testing, adjusting, and balancing of units; not work of this section.

1.4 Approval Submittals:

1.4.1 Product Data: Submit manufacturer's technical product data, including dimensions, ratings, electrical characteristics, weight, capacities, materials of construction, and installation instructions. Submit assembly-type drawings showing all piping and electrical connections and all mounting requirements. Show methods of fastening and assembly of components. Provide wiring diagrams.

1.5 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include these data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Quality Assurance:

2.1.1 Test and rate split system air conditioning units in accordance with ARI Standard 210, 240 or 360 as applicable, and provide certified rating seal.

2.1.2 Construct refrigeration system of split system air conditioning units in accordance with ASHRAE 15 (ANSI B 9.1) "Safety Code for Mechanical Refrigeration".

2.1.3 Provide split system air conditioning units with an SEER that meets the Florida Energy Efficiency Code and the schedule on the drawings.

2.1.4 Provide split system air conditioning units that are designed, manufactured, and tested in accordance with UL or ETL requirements.

2.1.5 Acceptable Manufacturers: Submit to compliance with requirements, provide units by Sanyo, Toshiba, Mitsubishi, or approved equal.

2.2 General:

2.2.1 Casings: Construct of painted mill galvanized steel (or aluminum) formed panels rigidly reinforced and braced. Each unit shall be provided with removable panels to permit the unit (including fans and compressors) to be properly maintained and serviced.

2.3 Condensing Unit:

2.3.1 Condenser Fans and Drives: Fan shall be of rustproof construction, hot dipped galvanized steel, stainless steel or aluminum. Unit shall have weather protected totally enclosed motor. Provide a close fretwork galvanized steel or non-ferrous fan guard. Motors shall be the permanently lubricated type, resiliently mounted.

2.3.2 Condenser Coil: Construct of non-ferrous tubes and aluminum fins. Provide inlet guard to protect condenser fins. Provide seacoast coating on coils.

2.3.3 Compressor: Shall be scroll or hermetic design with vibration isolation. Compressor shall not produce objectionable noise or vibration inside the building. Compressors shall have five (5) year warranty.

2.3.4 Service Valves: Provide for high and low pressure readings.

2.4 Evaporator Unit:

2.4.1 Interior of unit shall be thermally and acoustically insulated with 1 inch fiberglass duct liner insulation. Provide removable panels to permit the unit to be properly serviced and maintained.

2.4.2 The evaporator section shall include centrifugal fan, multi-speed fan motor, and direct drive. Provide cooling coil, snap out washable filters, refrigerant drier, controls and other necessary devices for a completely automatic unit. Coils shall have copper tubes and aluminum fins. Provide automatic oscillating louver action to facilitate air distribution.

2.5 Controls:

2.5.1 All safety and operational controls shall be factory wired.

2.5.2 Provide remote microprocessor-based controls with room thermostat, timer and fan speed switch.

2.6 Refrigerant Piping:

2.6.1 Copper tubing 3/4" and smaller: Type ACR, soft annealed temper; cast copper-alloy fittings for flared copper tubes; flared joints.

2.6.2 Brazing material: Silver solder bearing at least 15% silver; Sil Fos.

3 EXECUTION

3.1 Installation: Install in accordance with producer's printed instructions.

3.2 Refrigerant Piping: Comply with ANSI B31.5, "Refrigerant Piping," (extend lower pressure limits below 15 psig), and ASHRAE 15 (ANSI B9.1). Make all joints carefully and neatly. Clean pipe and fittings before fluxing. Remove burrs. Braze by the sweat method using Sil Fos. All refrigerant lines must be routed parallel or perpendicular to building lines. Soft copper lines must be straightened. Bends in soft copper must be made with bending tools.

3.3 Testing: After job erection, pressure test for leaks at 500 psig using a nominal amount of a

suitable tracer refrigerant and dry nitrogen or a suitable refrigerant. Perform leak tests with an electronic halide leak detector having a sensitivity of at least 1/2 ounce R-12 per year. Refrigeration piping will not be accepted unless it is gas tight.

3.4 Evacuation: After completing the successful pressure test, multiple-evacuate the system. Leave the compressor isolation valves shut and connect the vacuum pump to both the high and low sides. Evacuate the system to an absolute pressure of 1,500 microns. Then break vacuum to 2 psig with dry nitrogen. Repeat this process. Install the proper biflow drier in the liquid line and evacuate the system to 500 microns. Leave vacuum pump running for at least two hours without interruption. Break vacuum with the refrigerant to be used and raise pressure to 2 psig. Do not operate compressors during the evacuation procedure.

3.5 Charging: After completing the successful evacuation procedure, charge refrigerant directly to the system from the original containers through a filter drier. Charge to the manufacturer's stated conditions of pressure for required temperature. Weigh the refrigerant added and record on the startup report.

3.6 Cleaning: Clean tar and all other soil from housing exterior. Leave ready for Division 7, Caulking Work. Caulk around pipe sleeves.

3.7 Condensate Drain: Pipe trapped copper condensate drain to outside the building or to a point of disposal as shown on the drawings. Pipe shall be full size of unit outlet. Refer to Division-15 section "Insulation" for pipe insulation.

3.8 Startup: Check entire assembly for correctness of installation, alignment, and control sequencing. Start all component parts in proper sequence. Make all adjustments required to insure proper smooth quiet operation.

END OF SECTION

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SECTION 15770 – AIR TO AIR ENERGY RECOVERY UNITS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Approval Submittals:

1.3.1 Product Data: Submit manufacturer's technical product data, including dimensions, ratings, electrical characteristics, weight, capacities, materials of construction, and installation instructions.

Fixed Plate Air to Air Heat Exchangers

1.3.2 Shop Drawings: Submit manufacturer's assembly-type shop drawings showing all duct and electrical connections and all mounting requirements. Show methods of fastening and assembly of components. Provide wiring diagrams.

1.4 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include these data, a copy of approval submittals, and wiring diagrams in O&M manual.

2 PRODUCTS

2.1 Quality Assurance:

2.1.1 Unit shall be constructed in accordance with CSA 439 and UL 1812 and shall carry the C/UL or (C)ETL label of approval.

2.1.2 The manufacturer shall provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

2.1.3 The unit shall be Listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers. The unit must pass commercial flammability requirements and shall not be labeled “For Residential Use Only”.

2.1.4 Energy effectiveness values shall be tested in accordance with ASHRAE 84 and ARI Standard 1060.

2.1.5 The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a

period of five years from the date of purchase.

2.1.6 Acceptable Manufacturers: Subject to compliance with requirements, provide units by: RenewAire, Greenheck or approved equal.

2.2 General:

2.2.1 Description: Provide fixed-plate cross-flow energy recovery heat exchange unit with integral supply and exhaust fan. Heat exchangers utilizing wheels are not permitted.

2.2.2 Units shall be factory-assembled, wired, and tested. All controls shall be factory-adjusted and preset to the design conditions.

2.3 Fixed-Plate Cross-Flow Heat Exchanger:

2.3.1 The heat exchanger shall transfer sensible and latent heat through molecular transport by hydroscopic resin. Exhaust and fresh airstreams shall be completely separate and shall not mix. Airflow through the ERV core shall be laminar over the products entire operating airflow range to avoid deposition of particulates on the interior of the energy exchange plate material.

2.3.2 The heat exchanger shall be capable of continuous operation with the need for bypass, recirculation, pre-heaters, or defrost cycles under normal operating conditions.

2.3.3 ERV cores shall be protected by a MERV-8 rated, spun polyester, disposable filter in both airstreams.

2.4 Casing:

2.4.1 The unit case shall be constructed of 24-gauge steel, with lapped corners and zinc plated screw fasteners. The case shall be finished with textured, powder coat paint. Case walls and doors shall be fully insulated with 1 inch, expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.

2.4.2 Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets.

2.5 Electrical: The unit shall have a line-cord power connection and be supplied with an internal 24 VAC transformer and relay. Interlock unit to run upon activation of either lights in either toilet room.

2.6 Motors: Motors shall be high efficiency type and comply with Division-15 section “Electric Motors”.

2.7 Vibration Isolation: Provide factory vibration isolation mounting kit. Provide flexible duct connection at unit flanges.

3 EXECUTION

3.1 Installation: Install in accordance with producer's printed instructions.

3.2 Construction Filters: Provide full filters in units during construction. After construction and prior to the test and balance being performed, install clean final filters. Maintain filters during construction.

3.3 Startup: Check entire assembly for correctness of installation, alignment, and control sequencing. Start all component parts in proper sequence. Make all adjustments required to insure proper smooth quiet operation.

END OF SECTION

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.SECTION 15840/HVAC METAL DUCTWORK

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods Sections apply to work of this section.

1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for exterior insulation of metal ductwork.

1.5 Refer to other Division-15 sections for ductwork accessories.

1.6 Codes and Standards:

1.6.1 SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" 1985 Edition for fabrication and installation of metal ductwork, unless otherwise noted.

1.6.2 NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.7 Approval Submittals:

1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for the following.

Factory-fabricated ductwork
Sealants
Duct liner
Adhesive
Flexible duct
Spin-in fittings
Side take-off fittings

1.7.2 Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.

2 PRODUCTS

2.1 Ductwork Materials:

2.1.1 Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied

spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

2.1.2 Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.2 Miscellaneous Ductwork Materials:

2.2.1 General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

2.2.2 Duct Liner: Fibrous glass, 1½ pcf minimum density, complying with Thermal Insulation Manufacturers Association (TIMA) AHC-101; of thickness indicated. Certainteed "Coated Ultralite", Owens Corning "Aeroflex", PPG "Textrafine", or Manville "Linacoustic".

2.2.3 Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".

2.2.4 Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

2.2.5 Duct Sealant: Provide non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

2.2.6 Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

2.2.7 Flexible Ducts: Provide flexible ductwork with an R-value of R-6unless the ductwork is in a ceiling return plenum. The use of flexible ductwork for connection of supply air including terminal units and return air devices is acceptable only where shown on the drawings.

2.2.7.1 Construction: Provide reinforced metalized polyester jacket that is tear and puncture resistant, air tight inner core with no fiberglass erosion in the air stream and an encapsulated wire helix. Flexible ductwork shall have a recommended operating pressure of 6" w.g. for sizes 4" through 12" diameter and 4" w.g. for sizes 14" through 20" diameter. All diameters shall be suitable for a negative operating pressure of 0.75" w.g. Flexible ductwork shall meet the requirements of UL-181, the Florida Energy Code, FBC, NFPA 90A and NFPA 90B.

2.2.7.2 Acceptable Manufacturers: Subject to compliance with requirements, provide R-6 flexible ductwork by: Atco 36, Flexmaster 8M-R6 or Thermaflex M-KE R6.

2.2.8 Spin-in and Side Take-off Fittings: Provide round branch run-outs as follows.

2.2.8.1 Supply air diffuser connections shall be low profile side take-off fittings equal to Crown 3300-DS or Flexmaster STOD-BO.

2.3 Fabrication:

2.3.1 Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

2.3.2 Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards", except provide sealant at all joints. Supply duct between AHU discharge and terminal units shall be minimum 4" pressure class. Duct downstream of terminal units, supply duct from single zone air conditioning units and, all return and exhaust duct shall be minimum 2" pressure class unless otherwise noted.

2.3.3 Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1½ times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.

2.3.4 Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Ductwork Accessories" for accessory requirements.

2.3.5 Fabricate ductwork or plenums with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct (100% coverage) in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners (Grip Nails or Stic Klips) on 16 centers. On horizontal runs install top and bottom first and wedge sides between top and bottom. Apply a brush coat of fire retardant over all joints, visible cut edges, and leading edges to prevent erosion.

2.4 Factory-Fabricated Low Pressure Ductwork (Maximum 2" W.G.):

2.4.1 Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.

2.4.2 Gauge: 28-gauge minimum for round ducts and fittings, 4" through 8" diameter. 26-gauge minimum 9" through 14", 24-gauge minimum 15" through 26".

2.4.3 Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.

2.4.4 Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.

2.4.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork by Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp, or approved equal.

2.5 Factory-Fabricated High Pressure Ductwork (3" W.G. and Higher):

2.5.1 Round Ductwork: Construct of galvanized sheet steel complying with ASTM A 527 by the following methods and in minimum gauges listed.

Diameter	Minimum Gauge	Method of Manufacture
3" to 14"	26	Spiral Lockseam
15" to 26"	24	Spiral Lockseam
27" to 36"	22	Spiral Lockseam
37" to 50"	20	Spiral Lockseam
51" to 60"	18	Spiral Lockseam
Over 60"	16	Longitudinal Seam

Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams.

Diameter	Minimum Gauge
3" to 36"	20
38" to 50"	18
Over 50"	16

2.5.2 Flat-Oval Ductwork: Construct of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, in minimum gauges listed.

Maximum Width	Minimum Gauge
Under 25"	24
25" to 48"	22
49" to 70"	20
Over 70"	18

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams.

Maximum Width	Minimum Gauge
Under 37"	20
37" to 50"	18
Over 50"	16

2.5.3 Internally Insulated Duct and Fittings: Construct with outer pressure shell, 2" thick insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ASTM A 527, of spiral lockseam construction, use longitudinal seam for over 59", in minimum gauges listed.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 12"	26 ga.	24 ga.
13" to 24"	24 ga.	24 ga.

25" to 34"	22 ga.	24 ga.
35" to 48"	20 ga.	24 ga.
49" to 58"	18 ga.	24 ga.
Over 59"	16 ga.	20 ga.

Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 34"	20 ga.	20 ga.
36" to 48"	18 ga.	20 ga.
Over 48"	16 ga.	20 ga.

Inner Liner for Straight Duct: Perforate with 3/32" holes for 22% open area. Provide metal spacers welded in position to maintain spacing and concentricity. Provide a plastic film between the perforated liner and insulation to act as a vapor barrier.

Inner Liner for Fittings: Solid sheet metal. Provide metal spacers welded in position to maintain spacing and concentricity.

2.5.4 Optional Ducts and Fittings: At Installer's option, provided that certified tests by Manufacturer show that rigidity and performance is equivalent to SMACNA standard gauge ductwork, provide ducts and fittings as follows:

Ducts: Construct of Manufacturer's standard gauge, with spiral lock seam and intermediate standing rib.

Fittings: Construct by fabricating with spot welding and bonding with neoprene-base cement in lieu of continuous weld seams.

2.5.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-fabricated ductwork Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp., or approved equal.

3 EXECUTION

3.1 General: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation Of Metal Ductwork:

3.2.1 General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8” misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-

to-shape and to prevent buckling. Support vertical ducts at every floor.

3.2.2 Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.

3.2.3 Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding. High velocity rectangular ducts shall have approved joints and be made airtight with sealer or welding.

3.2.4 Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to ½" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

3.2.5 Internally Lined Ductwork: Cover leading and trailing edge of duct liner with sheet metal nosing zee.

3.2.6 Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other electrical equipment spaces and enclosures.

3.2.7 Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1½". Fasten to duct and substrate. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.

3.2.8 Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

3.2.9 Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.

3.3 Installation of Flexible Ducts:

3.3.1 Maximum Length: For any duct run using flexible ductwork, do not exceed 5'-0" extended length. Flexible duct shall only be allowed as detailed on the drawings.

3.3.2 Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible". Support flexible ducts to eliminate pinching and kinking

which would restrict flow.

3.3.3 Downstream of VAV Boxes: Peel back insulation and slide the inner core over the spin-in or diffuser neck, seal with duct sealant and install Panduit strap tightly. Slide insulation back over the inner core and install another Panduit strap over the insulation outer jacket. Tape is not acceptable.

3.3.4 Upstream of VAV Boxes: Install same as downstream, except use stainless steel worm-gear clamps instead of Panduit straps.

3.3.5 Seal all exposed edges of fiberglass insulation with glassfab and mastic.

3.4 Leakage Tests: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Test pressure shall be equal to pressure class of duct, less 0.5" static pressure. Repair leaks and repeat tests until total leakage is less than 5% of system design air flow for low pressure systems and less than 1% for systems rated over 3".

3.5 Equipment Connections: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.

3.6 Clean ductwork internally free of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.

3.7 Balancing: Refer to Division-15 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

3.8 System Adjustment: Adjust the system to provide functional operation to the extent possible, and leave ready for Testing and Balancing work. It is not the intent of this section to provide final testing and balancing, but to leave the system operational with a minimum of noise.

END OF SECTION

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SECTION 15842/FABRIC DISPERSION DUCTWORK

1 GENERAL

1.1 DESCRIPTION OF WORK:

1.2 Extent of non-metal ductwork is indicated on drawings and by requirements of this section.

1.3 Types of non-metal ductwork required for this project include the following:

1.3.1 Fabric Air Dispersion Products.

1.4 QUALITY ASSURANCE:

1.4.1 Building Codes and Standards:

1.4.2 Product must be Classified by Underwriter's Laboratories in accordance with the 25/50 flame spread / smoke developed requirements of NFPA 90-A and are also classified in accordance with ICC Evaluation Service AC167.

1.4.3 All product sections must be labeled with the logo and classification marking of Underwriter's Laboratories.

1.5 Design & Quality Control

1.5.1 Manufacturer must have documented design support information including duct sizing, vent and orifice location, vent and orifice sizing, length, and suspension. Parameters for design, including maximum air temperature, velocity, pressure and fabric permeability, shall be considered and documented.

1.6 SUBMITTALS:

1.6.1 Product Data: Submit manufacturer's specifications on materials and manufactured products used for work of this section. Manufacturer shall submit throw data at both minimum and maximum airflows.

1.6.2 Building Code Data: Submit UL file number under which product is Classified by Underwriter's Laboratories.

1.7 WARRANTY

1.7.1 Manufacturer must provide a 5 Year Product Warranty for products supplied for the fabric portion of this system as well as a Design and Performance Warranty.

1.8 DELIVERY, STORAGE AND HANDLING:

1.8.1 Protect fabric air dispersion systems from damage during shipping, storage and handling.

1.8.2 Where possible, store products inside and protect from weather. Where necessary to store outside, store above grade and enclose with a vented waterproof wrapping.

2 PRODUCTS

2.1 MANUFACTURER:

2.1.1 Subject to compliance with requirements, choose one of the following:

DuctSox® Corporation
Phone: (866) DUCTSOX or (563) 589-2777
FAX: (866) 398-1646 or (563) 589-2754
www.DuctSox.com

2.2 FABRIC AIR DISPERSION SYSTEM:

2.2.1 Verona Fabric: Air diffusers shall be constructed of a woven fire retardant fabric complying with the following physical characteristics:

Fabric Construction: 100% Flame Retardant
Weight: 5.2 oz. /yd^2 per ASTM D3776
Color: as selected by architect
Fabric Porosity: 1.5 (+2/-1) cfm/ft^2 per ASTM D737, Frazier
Temperature Range: 0 degrees F to 180 degrees F
Fire Retardancy: Classified by Underwriters Laboratories in accordance with the requirements of NFPA 90-A and AC-167 (noted above).

2.3 SYSTEMS FABRICATION REQUIREMENTS:

2.3.1 Air dispersion accomplished by linear vent and permeable fabric. Linear vent is to consist of an array of open orifices rather than a mesh style vent to reduce maintenance requirements of mesh style vents. Linear vents should also be designed to minimize dusting on fabric surface.

2.3.2 Size and location of linear vents to be specified and approved by manufacturer.

2.3.3 Inlet connection to metal duct via fabric draw band with anchor patches as supplied by manufacturer. Anchor patches to be secured to metal duct via zip screw fastener – supplied by contractor.

2.3.4 Inlet connection includes zipper for easy removal / maintenance.

2.3.5 Lengths to include required zippers as specified by manufacturer.

2.3.6 System to include Adjustable Flow Devices to balance turbulence, airflow and distribution as needed. Flow restriction device shall include ability to adjust the airflow resistance from 0.06 – 0.60 in w.g. static pressure.

2.3.7 Fabric system shall include connectors to accommodate suspension system listed below.

2.3.8 Any deviation from a straight run shall be made using a gored elbow or an efficiency tee. Normal 90 degree elbows are 5 gores and the radius of the elbow is 1.5 times the diameter of the DuctSox.

2.4 DESIGN PARAMETERS:

2.4.1 Fabric air diffusers shall be designed from 0.25” water gage minimum to 3.0” maximum, with 0.5” as the standard.

2.4.2 Fabric air diffusers shall be limited to design temperatures between 0 degrees F and 180 degrees F (-17.8 degrees C and 82 degrees C).

2.4.3 Design CFM, static pressure and diffuser length shall be designed or approved by the manufacturer.

2.4.4 Do not use fabric diffusers in concealed locations.

2.4.5 Use fabric diffusers only for positive pressure air distribution components of the mechanical ventilation system.

2.5 SUSPENSION HARDWARE: (include applicable components only)

2.5.1 Hoops (IHS) System: Air diffusers shall be constructed with internal retention system.

1. System shall consist of an internal 360 degree hoop system, spaced 5’ on center.
2. System shall be installed with a one row suspension system located 1.5” above top-dead-center of the textile system.
3. System attachment to cable shall be made using Gliders spaced 12 inches.
4. One row suspension
    a. Cable suspension hardware to include cable, eye bolts, thimbles, cable clamps, and turnbuckle(s) as required.
        1. Cable suspension
            a. Galvanized steel cable
        2. Support lengths of 5’

3 INSTALLATION

3.1 INSTALLATION OF FABRIC AIR DISPERSION SYSTEM:

3.1.1 Install chosen suspension system in accordance with the requirements of the manufacturer. Instructions for installation shall be provided by the manufacturer with product.

3.2 CLEANING AND PROTECTION:

3.2.1 Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.

3.2.2 Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.

3.2.3 If DuctSox systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

END OF SECTION

SECTION 15855 - DUCTWORK ACCESSORIES

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.5 Codes and Standards:

1.5.1 SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" .

1.5.2 NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:

Low pressure manual dampers
Control dampers
Flexible connections
Duct Access Doors
Pressure Relief Doors

1.6.2 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include this data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Dampers:

2.1.1 Low Pressure Manual Dampers: Provide 16 gauge dampers of single-blade type (12" maximum blade width) or multiblade type. Damper blades to be gang-operated from a single shaft with nylon or ball bearings on each end. Provide indexed locking quadrant. Parallel or opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct.

2.1.2 Acceptable Manufacturers: Subject to compliance with requirements, provide dampers by Air Balance, American Warming & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.

2.2 Control Dampers: Extruded aluminum (6063-T5) damper frame shall not be less than 0.080" in thickness. Damper frame shall be 4" deep x 1", with duct mounting flanges on both sides of frame. Damper frame shall have a 2" mounting flange on the rear of the damper when installed as Extended Rear Flange install type. Aluminum frame shall be clear anodized to a minimum thickness of 0.7 mil deep. Frame shall be assembled using stainless steel screws. Welded frames shall not be acceptable. Actuators (motors) are provided by control contractor.

2.2.1 Blades shall be maximum 6.4" deep extruded aluminum (6063-T5) air-foil profiles with a minimum wall thickness of 0.06", clear anodized to a minimum thickness of 0.7 mil deep.

2.2.2 Blade seals shall be extruded silicone, secured in an integral slot within the aluminum blade extrusions and shall be mechanically fastened to prevent shrinkage and movement over the life of the damper. Adhesive or clip-on type blade seals will not be approved.

2.2.3 Hexagonal control shaft shall be $^{7}/_{16}$". It shall have an adjustable length and shall be an integral part of the blade axle. A field-applied control shaft shall not be acceptable. All parts shall be stainless steel.

2.2.4 Linkage hardware shall be aluminum and stainless steel, installed in the frame side, out of the airstream, and accessible after installation. Linkage hardware shall be complete with stainless steel cup-point trunnion screws to prevent linkage slippage. Linkage that consists of metal rubbing metal will not be approved.

2.2.5 Dampers shall be designed for operation in temperatures ranging from -40°F to 212°F.

2.2.6 Dampers shall be AMCA rated for Leakage Class 1A at 1 in w.g. static pressure differential. Standard air leakage data to be certified under the AMCA Certified Ratings Program.

2.2.7 Dampers shall be custom made to required size, with blade stops not exceeding 1¼" in height.

2.2.8 Dampers shall be opposed blade for modulating dampers or parallel blade action for open/shut dampers.

2.2.9 Dampers shall be installed in the following manner: Installed in Duct

2.2.10 Installation of dampers must be in accordance with TAMCO's current installation guidelines, provided with each damper shipment.

2.2.11 Field supplied intermediate structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width.

2.2.12 Acceptable Manufacturers: Subject to compliance with requirements, provide Ruskin TED50CE control dampers or approved equal.

2.3 Turning Vanes: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

2.4 Duct Access Doors:

2.4.1 General: Provide duct access doors of size indicated, or as required for duty indicated.

2.4.2 Construction: Construct of same or greater gauge as ductwork served. Provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.

2.4.3 Acceptable Manufacturers: Subject to compliance with requirements, provide access doors by Air Balance, Inc., Duro Dyne Corp., Ruskin Mfg. Co., or Ventfabrics, Inc.

2.5 Flexible Connections:

2.5.1 General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.5.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

3 EXECUTION

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

3.2 Installation of Ductwork Accessories:

3.2.1 Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

3.2.2 Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.

3.2.3 Install turning vanes in square or rectangular 90º elbows in supply, return, and exhaust air systems, and elsewhere as indicated.

3.2.4 Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter. Install damper above accessible ceilings for fire dampers and motorized control dampers.

3.2.5 Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.

3.2.6 Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for

air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.

3.4 Adjusting and Cleaning:

3.4.1 Adjusting: Adjust ductwork accessories for proper settings.

3.4.2 Final positioning of manual dampers is specified in Division-15 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.

3.4.3 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

SECTION 15860 - GRILLES, REGISTERS AND CEILING DIFFUSERS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for ductwork and duct accessories required in conjunction with air outlets and inlets and for balancing of air outlets and inlets; not work of this section.

1.5 Codes and Standards:

1.5.1 ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual". Provide air outlets and inlets bearing ADC Certified Rating Seal.

1.5.2 NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.6 Approval Submittals:

1.6.1 Product Data: Submit manufacturer's technical product data for air outlets and inlets indicating construction, finish, and mounting details.

1.6.2 Performance Data: For each type of air outlet and inlet furnished, provide aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections and data as required.

1.7 O&M Data Submittals: Submit cleaning instructions for finishes and spare parts lists. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 General:

2.1.1 Except as otherwise indicated, provide manufacturer's standard grilles, registers, and ceiling diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

2.1.2 Manufacturers not listed in the following specification will not be considered for approval unless accepted by addendum prior to bid.

2.1.3 Performance: Provide grilles, registers and ceiling diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device equal to the basis of design.

2.1.4 Ceiling and Wall Compatibility: Provide grilles, registers and diffusers with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into ceiling module or wall with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems and walls which will contain each type of ceiling diffuser, grille, or register.

2.1.5 Appearance: All grilles and registers shall be aluminum construction and all diffusers shall be aluminum construction, unless otherwise noted, with uniform matching appearance for each type of outlet. Ceiling mounted grilles and registers shall be set to be sight tight from the predominant exposure.

2.1.6 Finish: All ceiling mounted grilles, registers, and diffusers shall be finished with baked white enamel. Wall and door mounted grilles and registers shall be finished with clear anodized finish .

2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Titus, Price, Tuttle and Bailey, or Metal Aire.

2.3 Rectangular Ceiling Diffusers: Provide rectangular face, diffuser with removable inner core, no corner joints. If square or rectangular neck is provided, provide square to round adaptor as required. Provide lay-in panel as required.

2.4 Return Grilles: Provide return grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations.

2.5 Exhaust Grilles: Provide exhaust grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations.

2.6 Transfer Grilles: Provide transfer grilles with one set of 45 degree fixed louvers, parallel to the long dimension.

3 EXECUTION

3.1 Coordinate installation with ceiling and light fixture installation. Locate ceiling outlets as indicated on architectural Reflected Ceiling Plans. Unless otherwise indicated, locate ceiling outlets in the center of acoustical ceiling modules with sides parallel to the grid.

3.2 Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

3.3 Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

3.4 Set air volumes to values shown on the drawings so that the system is functional. Leave ready for test and balance contractor.

3.5 Furnish to Owner three operating keys for each type of outlet and inlet that require them; obtain receipt.

END OF SECTION

SECTION 15890 - AIR TERMINALS

1 GENERAL

1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.

1.3 Extent of air terminals work required by this section is indicated on drawings and schedules, and by requirements of this section.

1.4 Refer to other Division-15 sections for external insulation of air terminals; not work of this section.

1.5 Refer to other Division-15 sections for testing, adjusting and balancing of air terminals; not work of this section.

1.6 Refer to other Division-15 sections for temperature controls which are to be furnished by others but installed as work of this section.

1.7 Refer to Division-16 sections for the following work; not work of this section. Power supply wiring from power source to power connection on air terminals. Include starters, disconnects, and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer.

1.8 Codes and Standards:

1.8.1 ADC Compliance: Provide air terminals which have been tested and rated in accordance with ADC standards.

1.8.2 NFPA Compliance: Construct air terminals using acoustical and thermal insulations complying with NFPA 90A "Air Conditioning and Ventilating Systems".

1.9 Approval Submittals:

1.9.1 Product Data: Submit manufacturer's technical product data, including performance data for each size and type of air terminal furnished; schedule showing drawing designation, room location, number furnished, model number, size, and accessories furnished; and installation and start-up instructions. Submit manufacturer's assembly-type drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

Shutoff single duct VAV boxes

1.10 O&M Data Submittals:

1.10.1 Wiring Diagrams: Submit ladder-type wiring diagrams for electric power and control components, clearly indicating required field electrical connections. Include in O&M manual.

1.10.2 Maintenance Data: Submit maintenance data and parts list for each type of air terminal; including "trouble-shooting" maintenance guide. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air terminals of one of the following (unless otherwise noted): Trane, Titus, Nailor, Enviro-Tec, or approved equal.

2.2 General: Provide factory-fabricated and tested air terminals as indicated, selected with performance characteristics which match or exceed those indicated on schedule.

2.3 Shutoff Single Duct: Provide pressure independent single duct, shut-off variable volume terminal units with the following characteristics, features and accessories and as indicated on drawings and schedule.

2.3.1 Casings: The unit casing shall be 24 gauge galvanized steel, internally lined with closed cell insulation which complies with UL 181 and NFPA 90A. All exposed insulation edges shall be coated with NFPA 90A approved sealant to prevent erosion. Casing shall be sealed to hold leakage to 2% at 3.0" w.g.

2.3.2 Air Dampers: Damper shall be heavy gauge metal, with shaft rotating in self-lubricating nylon or equal bearings. Shaft shall be marked on the end to indicate the damper blade position. Unit shall be designed for field conversion from normally open to normally closed, or vice versa, without relocating the actuator, changing parts or adding relays. The damper shall seal against a closed-cell foam gasket, to limit close-off leakage to 10 cfm at 3.0" w.g. The damper shall not unseat at 6.0" w.g.

2.3.3 Provide hanger brackets for attachment of supports.

2.3.4 Access: Provide hinged access panel in casing to permit access to air dampers and other parts requiring service, adjustment, or maintenance.

2.3.5 Controls: Units shall have pressure independent DDC controls provided by the DDC contractor. Provide controls enclosure and factory mounted xxxV/1 phase to 24V transformer. Provide hinged access door for control panel.

At an inlet velocity of 2000 fpm, the differential static pressure for any size of unit shall not exceed 0.30" w.g. for the basic unit.

The unit inlet shall be equipped with a flow sensor with amplifying pressure pickup points connected to central averaging chambers. The sensor shall maintain control accuracy with the same size inlet duct in any configuration. The flow sensor shall have a minimum of three sensor points.

2.3.6 Electric Reheat Coils: Provide factory mounted SCR Controlled coil with manual reset thermal cutouts. Coil voltage and stages are noted on the drawings.

3 EXECUTION

3.1 Examine areas and conditions under which air terminals are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 General: Install air terminals as indicated, and in accordance with manufacturer's installation instructions.

3.3 Location: Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

3.3.1 Identification dot shall be added to ceiling grid indicating terminal unit location. Label with terminal unit number shall be located on grid adjacent to dot.

3.4 Duct Connections: Connect ductwork to air terminals in accordance with Division-15 ductwork sections. Flexible ductwork is not allowed upstream of air terminals.

3.5 Upon completion of installation and prior to initial operation, test and demonstrate that air terminals, and duct connections to air terminals, are leak-tight.

3.6 Repair or replace air terminals and duct connections as required to eliminate leaks, and retest to demonstrate compliance. Leave operational and ready for Testing and Balancing work.

3.7 Clean exposed factory-finished surfaces. Repair any marred or scratched surfaces with manufacturers touch-up paint.

END OF SECTION

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SECTION 15930 - DIRECT DIGITAL CONTROLS

1 GENERAL

1.1 OVERVIEW

1.1.1 Furnish all labor, materials, equipment, and service necessary for a complete and operating temperature control system, utilizing Direct Digital Controls, electronic interfaces and actuation devices, as shown on the drawings and as described herein.

1.1.2 All labor, material, equipment and software necessary to meet the functional intent of the system, as specified herein and as shown on the drawings, shall be included. Drawings are diagrammatic only. 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.

1.1.3 All controls work shall be Schneider Electric I/A Series products by the authorized area dealer: Systems Specialists, Inc. 114 E. Wright Street, Pensacola, FL 32501 by prior agreement with Escambia County Schools. The engineer shall publish an allowance for the controls work that shall be included in each bidder's base bid. SSI shall work as a sub-contractor to the mechanical contractor.

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

1.2.1 AIR-MOVEMENT AND CONTROL ASSN, INC (AMCA)
AMCA 500 - Test Methods for Louvers, Dampers and Shutters

1.2.2 AMERICAN NATIONAL STANDARDS INSTITUTE, INC (ANSI)
ANSI B40.1 -Gauges-Pressure Indicating Dial Type-Elastic Element

1.2.3 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM A 269 -Seamless and Welded Austenitic Stainless Steel Tubing for General Service
2. ASTM B 88 - Seamless Copper Water Tube
3. ASTM D 635 Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position
4. ASTM D 1693 - Environmental Stress-Cracking of Ethylene Plastics

1.2.4 FEDERAL COMMUNICATIONS COMMISSION (FCC)
FCC Part 15 - (Vol II) Radio Frequency Devices

1.2.5 FEDERAL SPECIFICATIONS (FS)
FS GG-T-321 - (Rev D; Am 2) Thermometers, Self-Indicating Liquid-in-Glass for Machinery and Piping Systems

1.2.6 INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC (IEEE)
IEEE No. 587 - Guide for Surge Voltage in Low Voltage AC Power Circuits

1.2.7 NATIONAL ELECTRICAL MANUFACTURERS ASSN (NEMA)
NEMA 250 - Enclosures for Electrical Equipment Incl Rev 1
(1000 Volts Maximum)

1.2.8 UNDERWRITERS LABORATORIES, INC (UL)

1. UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances
2. UL 916 - Energy Management Equipment

1.3 GENERAL REQUIREMENTS

1.3.1 Standard Products: Material and equipment shall be standard products of a manufacturer regularly engaged in the manufacturing of such products, which are of a similar material, design and workmanship. The standard products shall have been in a satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year use shall include applications of equipment and materials under similar circumstances and of similar size. The 2 years experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation, for not less than 6000 hours exclusive of the manufacturer's factory tests, can be shown. The equipment items shall be supported by a service organization. The Contractor shall submit a certified list of qualified permanent service organizations and qualifications. These service organizations shall be reasonably convenient to the equipment on a regular and emergency basis during the warranty period of the contract.

1.3.2 Identical Items: Items of the same classification as specified in PART 2 - PRODUCTS shall be identical, including equipment, assemblies, parts, and components.

1.3.3 Nameplates, Lens Caps, and Tags: Nameplates and lens caps bearing legends as shown and tags bearing device unique identifiers as shown shall have engraved or stamped characters. Nameplates shall be mechanically attached to HVAC control panel interior doors. A plastic or metal tag shall be mechanically attached directly to each field-mounted device or attached by a metal chain or wire. Each air flow measurement station shall have a tag showing flow rate range for signal output range, duct size, and identifier as shown.

1.3.4 Verification of Dimensions: The Contractor shall become familiar with all details of the work, shall verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing any work.

1.3.5 Drawings: Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. The Contractor shall carefully investigate the mechanical, electrical, and finish conditions that could affect the work to be performed, shall arrange such work accordingly, and shall furnish all work necessary to meet such conditions. The construction drawings are not to be construed as shop drawings and are not intended to convey details of each sensor type and application. The appropriate device for each application is to indicated in the contractor’s shop drawings.

1.3.6 Power-Line Surge Protection: All equipment connected to ac circuits shall be protected from power-line surges. Equipment protection shall meet the requirements of IEEE No. 587. Fuses shall

not be used for surge protection.

1.3.7 System Support: The contractor shall provide 1 year of system support for all hardware in the control system at no additional cost to the building owner. System support shall include trouble-shooting, calibration, hardware replacement and other required services to maintain fully functioning, calibrated HVAC control systems. The system support service shall be available 5 days per week between 9 am and 4 pm. During the 1 year system support period, the contractor shall maintain a duplicate set of HVAC control drawings. At the owner's option, control problems will be solved by verbal instruction or on-site correction by the contractor. The number of system support calls and site visits shall be unlimited during the 1 year support period.

1.4 INSTALLATION

1.4.1 All work described in this section shall be installed, wired, circuit tested and calibrated by factory trained electricians and mechanics qualified for this work and in the regular employment of the temperature control system manufacturer or its exclusive factory authorized installing contracting field office (representative). The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company's relationship with the manufacturer. Installation shall not be subcontracted. Supervision, calibration and checkout of the system shall be by the employees of the local exclusive factory authorized temperature control contracting field office (branch or representative). The employees of the installing office shall be factory trained with training certification documentation provided in submittal package.

1.4.2 All temperature control and interlock wiring shall be installed in conduit unless otherwise noted on the plans. Power or interlock wiring shall be run in separate conduit from sensor and communications wiring.

1.5 SHOP DRAWINGS/SUBMITTALS

1.5.1 Submit four copies of shop drawings and product data.

1.5.2 Detail Drawings

1. Detail drawings shall be submitted. Detail drawings shall include: a drawing index; a list of symbols; a series of drawings for each HVAC control system using abbreviations, symbols, nomenclature and identifiers as shown on the contract drawings; valve schedules; damper schedules; and a compressed-air station schematic on 34-inch by 22-inch sheets. Detail drawings shall also include: equipment data, product specific catalog cuts, and an ASME air-storage tank certificate. All detail drawings shall be delivered together as a complete submittal. Valve and damper schedules may be submitted in advance but shall be included in the complete submittal.

2. Each control-system element on a drawing shall have a unique identifier as shown.

3. Each series of drawings for an HVAC control system shall include a schematic as shown, a ladder diagram as shown, an equipment schedule as shown, a wiring diagram, a list of equipment with manufacturer and model number, a control-panel arrangement drawing, and an HVAC control-system sequence of operation.

4. The wiring diagram shall show the interconnection of conductors and cables to HVAC control-panel terminal blocks and to the identified terminals of starters and packaged equipment, with all necessary jumpers and ground connections. The wiring diagram shall show the labels of all conductors. All sources of power required for HVAC control systems and for packaged-equipment control systems shall be identified back to the panel board circuit breaker number, HVAC system control panel, magnetic starter, or packaged control equipment circuit. Each power supply and transformer not integral to a controller, starter, or packaged equipment shall be shown. The connected volt-ampere load and the power supply volt-ampere rating shall be shown.

5. The HVAC control-panel arrangement drawing shall show nameplate legends, fabrication details, and enclosure operating temperature-rise calculations. Fabrication details shall include interior door front and rear views, back panel layout and terminal block layout.

6. The sequence of operation for each HVAC control system shall be in the language and format shown on the drawings. No operational deviations from specified sequences will be permitted without prior written approval of the Contracting Officer. The sequence of operation shall refer to each device by its unique identifier.

7. The valve schedule shall include each valve's unique identifier, size, flow coefficient (Cv), pressure drop at specified flow rate, spring range, positive-positioner range, and actuator size, supported by close-off pressure data, dimensions, operation rate, and access and clearance requirements data.

8. The damper schedule shall contain each damper's and each actuator's identifier, nominal and actual sizes, orientation of axis and frame, direction of blade rotation, spring ranges, operation rate, positive-positioner ranges, locations of actuators and damper end switches, arrangement of sections in multi-section dampers, and methods of connecting dampers, actuators, and linkages. The damper schedule shall include the maximum expected velocity through the damper at the intended location and 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.

9. The equipment data shall be in booklet form, and indexed to the unique identifiers, and shall consist of data sheets that document compliance with the specification and a copy of each HVAC control system bill of materials. Catalog cuts shall be in booklet form indexed by device type. Where multiple components are show on a catalog cut, the application specific component shall be marked.

1.5.3 Test Reports

1. The Contractor shall submit 4 copies of the site testing procedures. The site testing procedures shall identify each item to be tested and shall clearly describe each test. The test procedures shall include a list of the test equipment to be used for site testing, manufacturer and model number, and the date of calibration and accuracy of calibration within 6 months of the test date.

2. The Contractor shall submit 4 copies of the site testing data. Original copies of all data produced during site testing, including results of each test procedure, shall be turned over to the owner

after owner approval of the site tests.

3. The Contractor shall furnish 4 copies of the performance verification test plans and procedures. The test plan and procedures for the performance verification test shall be indexed and submitted in booklet form 60 days before the Contractor's scheduled test dates.

4. The Contractor shall furnish 4 copies of the performance verification test report after completion of a successful test. Documentation of test results for the entire HVAC control system shall be submitted complete, in booklet form and indexed, within 30 days after each test.

1.5.4 Operation and Maintenance Manuals

1. The Contractor shall furnish 2 complete bound copies and one hard copy of operation manuals for each HVAC control system, in booklet form and indexed, outlining the step-by-step procedures required for each HVAC control system's startup, operation, and shutdown. The manuals shall include all detail drawings, equipment data, each controller's configuration check sheet and manufacturer supplied operation manuals for all equipment.

2. The Contractor shall furnish 2 complete hard copies and one digital copy of maintenance manuals, indexed in booklet form listing maintenance procedures. The maintenance instructions shall include a maintenance check list for each HVAC control system. Maintenance manuals shall include spare parts data and recommended maintenance tool kits for all control devices. Maintenance instructions shall include recommended repair methods, either field repair, factory repair, or whole-item replacement.

3. If operation and maintenance manuals are provided in a common volume, they shall be clearly differentiated and separately indexed.

1.5.5 Operating Instructions

1. Commissioning Procedures shall be provided for each HVAC control system, and for each type of terminal-unit control system. The procedures shall reflect the language and format shown. The commissioning procedures shall refer to the devices by their unique identifiers as shown. The commissioning procedures shall include step-by-step configuration procedures for each controller. The configuration procedures shall be product specific and shall include a configuration check sheet showing all configuration parameters, dip switch settings, initial recommended P, I and D constants.

1.5.6 Upon completion of the work, provide a complete set of drawings and application software on magnetic disk media or DVD. Drawings shall be provided as AutoCad compatible files.

1.5.7 Provide details of faces of EMCS/DDC panels, including controls instruments and labeling.

1.5.8 Provide a scaled floor plan drawing showing location of all conduit, control cabling, junction boxes, control devices, and surge suppression devices.

1.5.9 Submit screenshots of actual graphics for each piece of equipment.

1.6 DELIVERY AND STORAGE

1.6.1 Products shall be stored with protection from the weather, humidity and temperature variations, dirt and dust, and other contaminants, within the storage-condition limits published by the equipment manufacturer. Dampers shall be stored so that seal integrity, blade alignment and frame alignment are maintained.

1.7 INTEGRATION OF EQUIPMENT PROVIDED BY OTHERS

1.7.1 Where products provided by others are required to interface to the DDC system the Equipment provider shall be responsible for providing a Bacnet MSTP interface. The Equipment provider is responsible for providing a product that will properly interface with all specified points exposed and a table of points and point names to the DDC contractor.

2 PRODUCTS

2.1 All materials and equipment used shall be standard components, of regular manufacture for this application. All systems and components shall have been thoroughly tested and proven in actual use. Schneider Electric I/A Series products shall be provided and installed by the local authorized dealer, Systems Specialists Incorporated (850-432-0479). Products manufactured by other companies are not acceptable.

2.2 GENERAL EQUIPMENT REQUIREMENTS: The Contractor shall provide a Schneider Electric I/A Direct Digital Control System as specified below to match the existing site control system.

2.2.1 Schneider Electric I/A Series Direct Digital Control System: Schneider Electric I/A Direct Digital Control System, hereinafter referred to as I/A DDC, shall consist of an ENC Building Controller with Web page engineering and graphics, MNB for air handling units or DX units, MNB for boilers or chillers, and MNB Variable Air Volume Box Controllers for variable air volume terminals. Third party drivers, emulators or converters are not allowed. The system shall be complete with all sensors, wiring, software, and hardware to form a functional HVAC automation system. Sensors, sensor wiring, gauges, thermometers and other accessories which are not part of the packaged I/A system shall be as specified hereinafter. Control system submittals shall be made in accordance with paragraph 1.05 SHOP DRAWING/SUBMITTALS. In addition to the hardware and software required at the building, the contractor shall also provide the following software development for the existing I/A or Network 8000 Host System without the use of third party, non I/A drivers or software. All software engineering or development shall be performed on Schneider Electric provided software.

1. Graphical Building Representation: A graphical building representation with room names and room numbers shall be modified as required for the Web based System. The software shall allow logical routing from the room to the boiler and/or chiller through all intermediate items of equipment. At each level, the user shall be able to route to the previous display, the next logical equipment item, or the main building plan. User interface shall be web based for use with roller mouse or digitizer for this operation. All building related attributes such as room setpoints, occupied schedules, etc. shall be displayed real-time and accessible from the graphic screen for modification.

2. Graphical System Schematics: A graphical system schematic for each air handling unit and

variable air volume terminal shall be supplied with all sensed parameters displayed. In addition to the sensed parameters, system schematics including water coils shall display the chilled water or hot water supply temperature as measured at the chiller or boiler respectively. All system related attributes such as equipment control setpoints, throttling ranges, operating schedules, etc. shall be displayed real-time and accessible from the graphic screen for modification.

2.2.2 Electrical and Electronic Devices

1. All electrical, electronic, and electro-pneumatic devices not located within an HVAC control panel shall have an enclosure NEMA 1 in accordance with NEMA 250 unless otherwise shown.

2. Standard Signals: The output of all analog transmitters and the analog input and output of all single-loop controllers and function modules shall be 4-to-20 mAdc signals. The signal shall originate from current-sourcing devices and shall be received by current-sinking devices.

2.2.3 Ambient Temperature Limits

1. Actuators and positive positioners, and transmitters shall operate within temperature limit ratings of plus 35 to 150 degrees F. All panel-mounted instruments shall operate within limit ratings of 35 to 120 degrees F and 10 percent to 95 percent relative humidity, noncondensing. All devices installed outdoors shall operate within limit ratings of minus 35 to 150 degrees F.

2.3 MATERIALS

2.3.1 Tubing

1. Copper: Copper tubing shall conform to ASTM B 88 and shall have sweat fittings and valves. Plastic tubing shall have barbed fittings and valves. Plastic tubing shall have the burning characteristics of linear low-density polyethylene tubing, shall be self-extinguishing when tested in accordance with ASTM D 635, shall have UL 94 V-2 flammability classification, and shall withstand stress cracking when tested in accordance with ASTM D 1693. Plastic-tubing bundles shall be provided with mylar barrier and flame-retardant polyethylene jacket.

2. Stainless Steel: Stainless steel tubing shall conform to ASTM A 269, and shall have stainless steel compression fittings.

2.3.2 Wiring

1. Terminal Blocks: Terminal blocks shall be insulated, modular, feed-through, clamp style with recessed captive screw-type clamping mechanism, shall be suitable for rail mounting, and shall have end plates and partition plates for separation or shall have enclosed sides.

2. Control Wiring for 24-Volt Circuits: Control wiring for 24-volt circuits shall be 18 AWG minimum and shall be rated for 300-volt service.

3. Wiring for 120-Volt Circuits: Wiring for 120-volt circuits shall be 14 AWG minimum and shall be rated for 600-volt service.

4. Analog Signal Wiring Circuits: Analog signal wiring circuits within control panels shall not be

less than 20 AWG and shall be rated for 300-volt service.

5. Instrumentation Cable: Instrumentation cable shall be 18 AWG, stranded copper, single or multiple-twisted, minimum 2-inch lay of twist, 100% shielded pairs, and shall have a 300-volt insulation. Each pair shall have a 20-AWG tinned-copper drain wire and individual overall pair insulation. Cables shall have an overall aluminum-polyester or tinned-copper cable-shield tape, overall 20-AWG tinned-copper cable drain wire, and overall cable insulation.

6. Non-conducting Wiring: Non-conducting wiring duct in control panels shall have slotted sides, snap-on duct covers, fittings for connecting ducts, mounting clips for securing ducts, and wire-retaining clips.

2.4 ACTUATORS

2.4.1 General Requirements: Actuators shall fail to their spring-return positions as shown on signal or power failure and shall have a visible position indicator. Actuators shall open or close the devices to which they are applied within 60 seconds after a full scale input signal change. Electric or electronic actuators operating in parallel or in sequence shall have an auxiliary actuator driver. Actuators shall be electronic.

1. Damper Actuators: Damper actuators shall be rated for at least 125 percent of the motive power necessary to operate against the pressure shown. The actuator stroke shall be limited by an adjustable stop in the direction of power stroke. The actuators shall be provided with mounting and connecting hardware.

2. Valve Actuators: Valve actuators shall be rated for at least 125 percent of the motive power necessary to operate the valves over their full range of operation against the total and differential pressures shown.

2.5 AUTOMATIC CONTROL VALVES

2.5.1 Valve Assembly: Valves shall have stainless-steel stems and stuffing boxes with extended necks to clear the piping insulation. Valve bodies shall be designed for not less than 125 psig working pressure or 150 percent of the system operating pressure, whichever is greater. Valve leakage rating shall be .01 percent of rated Cv.

2.5.2 Butterfly-Valve Assembly: Butterfly valves shall be threaded lug type suitable for dead-end service, and for modulation to the fully-closed position, with carbon-steel bodies and non-corrosive discs, stainless steel shafts supported by bearings, and EPDM seats suitable for temperatures from minus 20 degrees to plus 250 degrees F. Valves shall have a manual means of operation independent of the actuator.

2.5.3 Two-Way Valves: Two-way modulating valves shall have equal-percentage characteristics.

2.5.4 Three-Way Valves: Three-way valves shall provide linear flow control with constant total flow throughout full plug travel.

2.5.5 Valves for Chilled-Water:

1. Bodies for valves 1-1/2 inches and smaller shall be brass or bronze, with threaded or union ends. Bodies for valves from 2 inches to 3 inches inclusive shall be of brass, bronze or iron. Bodies for 2-inch valves shall have threaded ends. Bodies for valves from 2-1/2 inches to 3 inches shall have flanged-end connections. Valve Cv shall be 100 percent to 110 percent of the Cv shown. Internal valve trim shall be brass or bronze except that valve stems may be type 316 stainless steel.

2. Valves 4 inches and larger shall be butterfly valves.

2.6 DAMPERS

2.6.1 Refer to 15855 Ductwork Accessories.

2.6.2 Damper End Switches: Each end switch shall be a hermetically-sealed switch with a trip lever and over-travel mechanism. The switch enclosure shall be suitable for mounting on the duct exterior and shall permit setting the position of the trip lever that actuates the switch. The trip lever shall be aligned with the damper blade.

2.7 INSTRUMENTATION

2.7.1 Measurements: Transmitters shall be calibrated to provide the following measurements, over the indicated ranges, for an output of 4 to 20 mAdc:

1. Conditioned space temperature, from 50 to 85 degrees F.

2. Duct temperature, from 40 to 140 degrees F except that return-air temperature for economizer operation shall be minus 30 to plus 130 degrees F.

3. Chilled-water temperature, from 30 to 100 degrees F.

4. Outside-air temperature, from minus 30 to 130 degrees F.

5. Relative humidity, 0 to 100 percent for high-limit applications; from 20 to 80 percent for space applications.

6. Differential pressure for VAV supply-duct static pressure from 0 to 2.0 inches water gauge.

2.7.2 Temperature Instruments

1. Resistance Temperature Detectors (RTD): Each RTD shall be platinum with a tolerance of plus or minus 0.1 percent at 32 degrees F, and shall be encapsulated in epoxy, series 300 stainless steel, anodized aluminum, or copper. Each RTD shall be furnished with an RTD transmitter as specified, integrally-mounted unless otherwise shown.

    a. Continuous-Averaging RTD: Continuous-averaging RTDs shall have a tolerance of plus or minus 1.0 degree F at the reference temperature, and shall be of sufficient length to ensure that the resistance represents an average over the cross-section in which it is installed. The sensing element shall have a bendable copper sheath. Each averaging RTD shall be furnished with an RTD transmitter as specified, to match the resistance range of the

averaging RTD.

b. RTD Transmitter: The RTD transmitter shall be selected to match the resistance range of the RTD. The transmitter shall be a 2-wire, loop-powered device. The transmitter shall produce a linear 4-to-20 mAdc output corresponding to the required temperature measurement. The output error shall not exceed 0.1 percent of the calibrated measurement. The transmitter shall include offset and span adjustments.

2.7.3 Relative-Humidity Instruments: Relative-humidity sensing element shall use non-saturating sensing elements capable of withstanding a saturated condition without permanently affecting calibration or sustaining damage. Sensing elements shall have an accuracy of plus or minus 5 percent of full scale within the range of 20 to 80 percent relative humidity. A 2-wire, loop-powered transmitter located at the sensing elements shall be provided to convert the sensing elements output to a linear 4-to-20 mAdc output corresponding to the required humidity measurement. The transmitter shall be a 2-wire, loop-powered device. The output error shall not exceed 0.1 percent of calibrated measurement. The transmitter shall include offset and span adjustments.

2.7.4 Pressure Instruments: The instrument shall be a pressure transmitter with an integral sensing element. The instrument over pressure rating shall be 25 psig. The sensing elements accuracy shall be plus or minus 2 percent of full scale. Transmitter accuracy shall be plus or minus 0.25 percent of the calibrated measurement. The transmitter shall be a 2-wire, loop-powered device. The transmitter shall produce a linear 4-to-20 mAdc output corresponding to the required pressure measurement. Each transmitter shall have offset and span adjustments.

2.7.5 Thermowells: Thermowells shall be Series 300 stainless steel with threaded brass plug and chain, 2-inch lagging neck and extension-type well, and inside diameter and insertion length as required for the application.

2.7.6 Sunshields: Sunshields for outside-air temperature sensing elements shall prevent the sun from directly striking the temperature sensing elements. The sunshields shall be provided with adequate ventilation so that the sensing element responds to the ambient temperature of the surroundings. The top of each sunshield shall have a galvanized-metal rainshield projecting over the face of the sunshield. The sunshields shall be painted white or shall be unpainted aluminum.

2.7.7 Meters: Utility meters shall be provided with BACnet interface and a NIPR drop.

2.8 CONTROL DEVICES AND ACCESSORIES

2.8.1 Relays: Relays shall be 2-pole, double-throw (2PDT) with a 10-ampere resistive rating at 120 Vac, and shall have an enclosed 120-Vac coil with 11-pin blade connectors, and a matching rail-mounted socket. Power consumption shall not be greater than 3 watts.

2.8.2 Time-Delay Relays: Time delay relays shall be 2PDT with 8-pin connectors, dust cover, and a matching rail-mounted socket. Adjustable timing range shall be 0 to 5 minutes. Power consumption shall not be greater than 3 watts.

2.8.3 Regulated Power Supplies: Each power supply shall provide a 24-Vdc linear supply at not less than 2 amperes, with regulation to 0.05 percent of output voltage. Each power supply shall have a fused input, and shall be protected from voltage surges and power-line transients. The power supply

output shall be protected against overvoltage and short circuits. Power supply loading shall not be greater than 1.2 amperes.

2.9 PILOT LIGHTS AND MANUAL SWITCHES

2.9.1 Pilot Lights, Illuminated Switches, and Non-illuminated Switches: Pilot lights, illuminated switches, and non-illuminated switches shall be rectangular devices arranged in a horizontal matrix as shown. Switch action shall be as shown. Device illumination shall be by light-emitting diode lamp or by neon lamp.

2.9.2 Manual Timed Override Switches: Manual timed override switches shall be spring-wound mechanical type, with timer range as specified on the drawings. Switches shall be furnished with a faceplate with time intervals permanently etched or engraved in the faceplate at the time of manufacture. Timer knob shall have a pointer to indicate setting position. Switches shall be suitable for mounting in a standard 2" x 4" outlet box. Contacts shall be rated for 20 amp resistive load at 125 volts. Switches shall be UL listed.

2.10 HVAC SYSTEM CONTROL PANELS

2.10.1 Panel Assembly: The panel shall be fabricated as shown, and the devices shall be mounted as shown. Each panel shall be fabricated as a bottom-entry connection point for control-system electric power, control-system main air source, control-system wiring, pneumatic tubing, interconnection of control systems, interconnection of starters and external shutdown devices, and energy monitoring and control systems (EMCS) interface. Each panel shall have an operating temperature rise of not greater than 20 degrees F above an ambient temperature of 100 degrees F.

2.10.2 Panel Electrical Requirements: Each control panel shall be powered by nominal 120 volts ac terminating at the panel on terminal blocks. Instrument cases shall be grounded. Interior panel, interior door, and exterior panel enclosure shall be grounded.

2.10.3 Enclosure: The enclosure for each panel shall be a NEMA 1 single-door wall-mounted box, continuous hinged exterior door, key lock, interior back panel.

2.10.4 Mounting and Labeling: Controllers, pilot lights and switches, shall be mounted on the interior door as shown. Power conditioner, fuses and duplex outlet shall be mounted on the interior of the cabinet as shown. All other components housed in the panel shall be mounted on the interior back panel surface of the enclosure, behind the door on rails as shown. Controllers and gauges shall be identified by a plastic or metal nameplate that is mechanically attached to the panel. The nameplate shall have the inscription as shown. Lettering shall be cut or stamped into the nameplate to a depth of not less than 1/64 inch, and shall show a contrasting color, produced by filling with enamel or lacquer or by the use of a laminated material. Painting of lettering directly on the surface of the interior door or panel is not permitted.

2.10.5 Wiring and Tubing

1. Wiring Interconnections: Wiring shall be installed in wiring ducts in such a way that devices can be added or replaced without disturbing wiring that is not affected by the change. Wiring to single-loop controllers shall have a 4-inch wiring loop in the horizontal wiring duct at each wiring connection. There shall be no wiring splices within the control panel. All

interconnections required for power or signals shall be made on device terminals or panel terminal blocks, with not more than 2 wires connected to a terminal.

2. Terminal Blocks: Terminal blocks shall be arranged in groups as shown. Instrument signal grounds at the same ground reference level shall end at a grounding terminal for connection to a common ground point. Wiring-shield grounds at the same reference level shall end at a grounding terminal for connection to a common ground point. Grounding terminal blocks shall be identified by reference level.

3. Wiring Identification: All wiring connected to controller shall be identified by function and polarity, i.e., process variable, input, remote setpoint input and output.

2.10.6 EMCS Terminal Blocks: Terminal blocks shall be provided for connections to EMCS as shown. Analog signals shall require only the removal of jumpers to interface to EMCS.

2.11 ELECTRONIC VARIABLE AIR VOLUME (VAV) TERMINAL UNIT CONTROLS

2.11.1 Terminal-Unit Controls

1. Vav Box Controller: Controls for pressure-independent boxes shall consist of a velocity-sensing device in the primary air entering the box, a room temperature sensing element, a damper actuator, a duct temperature sensor, and an adjustable microprocessor-based VAV box controller. Each controller shall operate a damper for cooling and, if required, a duct coil valve for heating. Actuators shall open and close the device to which it is applied within 6 minutes. The controller shall be fully compatible with and capable of communicating with the existing Schneider Electric I/A EMCS system without third party devices. The controller shall be capable of reading cfm, duct temperature, room temperature, cooling setpoint, and damper position. Terminal unit controls shall have the requirements of UL 916 and FCC Part 15.

3 EXECUTION

3.1 Examine areas and conditions under which EMCS/DDC work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.

3.2 Identification of EMCS/DDC:

3.2.1 Label all sensors, valves, dampers, safety devices and controllers with engraved tags matching the shop drawings.

3.3 GENERAL INSTALLATION CRITERIA: The HVAC control system shall be completely installed and ready for operation, as specified and shown. Dielectric isolation shall be provided where dissimilar metals are used for connection and support. Penetrations through and mounting holes in the building exterior shall be made watertight. The HVAC control-system installation shall provide clearance for control-system maintenance by maintaining access space between coils, access space to mixed-air plenums, and other access space required to calibrate, remove, repair, or replace control-system devices. The control-system installation shall not interfere with the clearance requirements for mechanical and electrical system maintenance.

3.3.1 Device-Mounting Criteria: 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 manufacturers' recommendations and as shown. Mount panels and devices at locations and heights convenient for casual service. Control devices to be installed in piping and ductwork shall be provided with all required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration. Strap-on temperature sensing elements shall not be used except as specified.

3.3.2 Wiring Criteria: Wiring external to control panels, including low-voltage wiring, shall be installed in metallic raceways. Wiring shall be installed without splices between control devices and HVAC control panels. Instrumentation grounding shall be installed as necessary to prevent ground loops, noise, and surges from adversely affecting operation of the system.

3.3.3 Controller Output Loop Impedance Limitation: Controller output loops shall be constructed so that total circuit impedance connected to the analog output of a single-loop controller shall

3.3.4 Damper Actuators

1. Actuators shall not be mounted in the air stream.

2. Multiple actuators operating a common damper shall be connected to a common drive shaft.

3. Actuators shall be installed so that their action shall seal the damper to the extent required to maintain leakage at or below the specified rate and shall move the blades smoothly.

3.3.5 Room-Instrument Mounting: Room instruments shall be mounted so that their sensing elements are 5 feet above the finished floor unless otherwise shown.

3.3.6 Low-Temperature-Protection Thermostats: For each 20 square feet of coil-face area, or fraction thereof, a thermostat shall be provided to sense the temperature at the location shown. The thermostat sensing element shall be installed in a serpentine pattern.

3.3.7 Averaging-Temperature Sensing Elements: Sensing elements shall have a total-element minimum length equal to one linear foot per square foot of duct cross-sectional area.

3.3.8 Duct Static-Pressure Sensing Elements and Transmitters: The duct static-pressure sensing element and transmitter sensing point shall be located approximately two-thirds of the distance from the supply fan to the end of the duct with the greatest pressure drop.

3.3.9 Indication Devices Installed in Piping and Liquid Systems: Gauges in piping systems subject to pulsation shall have snubbers. Thermometers and temperature sensing elements installed in liquid systems shall be installed in thermowells.

3.3.10 Tubing

1. Control System Installation: The control system shall be installed so that pneumatic lines are not exposed to outside-air temperatures. All tubes and tube bundles exposed to view shall be installed neatly in lines parallel to the lines of the building. Tubing in mechanical/electrical spaces shall be routed so that the lines are easily traceable.

2. Pneumatic Lines: In mechanical/electrical spaces, pneumatic lines shall be plastic tubing or copper tubing. Horizontal and vertical runs of plastic tubes or soft copper tubes shall be installed in raceways dedicated to tubing. The dedicated raceways shall be supported every 6 feet for horizontal runs and every 8 feet for vertical runs. Tubing not installed in raceways shall be hard-drawn copper tubing with sweat fittings and valves, supported every 6 feet for horizontal runs and every 8 feet for vertical runs.

3. Connection to Liquid Lines: Tubing for connection of sensing elements and transmitters to liquid lines shall be copper with brass compression fittings.

4. Connection to Ductwork: Tubing for connection of sensing elements and transmitters to ductwork shall be plastic tubing.

5. External Tubing: Tubing external to mechanical/electrical spaces, when run in plenum ceilings, shall be soft copper with sweat fittings, supported every 8 feet. Tubing not in plenum spaces shall be soft copper with sweat fittings supported every 8 feet or shall be plastic tubing in raceways dedicated to tubing.

3.4 Programming of EMCS/DDC:

3.4.1 The Contractor shall obtain operational schedules for the controlled equipment from the owner. Submittal data relevant to operational schedules shall be forwarded from the Contractor to the Engineer. Upon receipt of approval, the Contractor shall proceed with installation, setup, calibration and check out of the various control and monitoring systems.

Having completed component and system installation, the Contractor shall submit a written request to the Engineer to inspect and approve their satisfactory operation.

3.4.2 The EMCS/DDC shall perform all functions on the equipment as described in the Sequence of Operation and the drawings. This in conjunction with the drawings, defines the scope and extent of the project with regard to the required number of panels, control point relays, and devices. Field verify voltages at point-of-interface and provide relays as required.

3.4.3 Model numbers, horsepower, voltages, and other information equipment where listed on the drawings are for Contractor's convenience. Verify all information in the field as necessary for preparation of shop drawings.

3.5 Functional Requirements of EMCS/DDC:

3.5.1 Provide all necessary relays, sensors, wiring and contacts to achieve proper operation.

3.6 Adjusting and Cleaning:

3.6.1 Startup: Startup, test, and adjust the EMCS/DDC in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

3.6.2 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.6.3 Final Adjustment: After completion of installation, adjust the program, relays, interface devices, and similar equipment provided as work of this section for optimum operation.

3.7 Owner's Instructions:

3.7.1 During system startup and at such time acceptable performance of the EMCS/DDC hardware and software has been established, the Contractor shall provide on-site operator instruction. This instruction shall be performed during normal working hours and shall be conducted by a competent representative of the Contractor familiar with the system's software, hardware and accessories. The Contractor shall maintain a roster of all attendees at all training sessions.

3.7.2 At a time mutually agreed upon during system training as stated above, the Contractor shall give up to 4 hours (as needed) of instruction to the Owner's designated personnel on the operation of all equipment within the EMCS/DDC and describe its intended use with respect to the programmed functions specified.

3.7.3 Operator orientation of the EMCS/DDC shall include, but not be limited to, the overall operational program, equipment functions both individually and as part of the total integrated system, commands, advisories, and appropriate operator intervention required in responding to the EMCS/DDC operation.

3.7.4 Provide at least 14-day notice to Owner and Engineer of training dates.

3.8 System Verification: The manufacturer's authorized representative shall state in writing to the Engineer that the EMCS/DDC system is operating properly, final adjustments and calibrations are complete, and Owner training has been accomplished.

3.8.1 Commissioning: The manufacturer’s authorized representative shall meet with the commissioning agent to demonstrate proper operation and scheduling of each piece of equipment and all other functional performance test returned by the commissioning agent. The project will not be closed out until proper operation and scheduling has been demonstrated.

END OF SECTION

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SECTION 15970 - START-UP REQUIREMENTS FOR HEATING, VENTILATING, & AIR CONDITIONING (HVAC) SYSTEMS

1 GENERAL

1.1 Intent: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting Commissioning and Commissioning and TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

1.2.1 The Contractor shall furnish to the TAB Contractor a complete set of plans, specifications, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.

1.2.2 The Contractor shall participate in a HVAC Commissioning and TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for Commissioning and TAB work prior to start of said work.

1.3 Test Reports and Verification Submittals:

1.3.1 Submit Startup Report as described herein for each system. Attach Factory Startup Report for equipment as required by other Division-15 sections.

2 PRODUCTS: None

3 EXECUTION:

3.1 The Commissioning and TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.

3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of Commissioning and TAB work.

3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.

3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of Commissioning and TAB work.

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3.5 If the TAB Contractor is prevented from completing his work in a timely and continuous manner (according to the established TAB schedule) due to non-operable and/or incomplete HVAC systems, any additional fees for TAB work shall be the responsibility of the Contractor and shall be affected by change order reducing the Contract Amount.

3.6 Airside Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.

3.6.1 Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.

3.6.2 Verify that duct systems are clean of debris.

3.6.3 Verify that ducts attached with flexible connectors are aligned within ½" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated.

3.6.4 Verify that filters are clean and filter spacers are installed.

3.6.5 Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.

3.6.6 Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.

3.6.7 Verify proper fan rotation.

3.6.8 Verify proper belt drive alignment.

3.6.9 Verify fan motor overload elements are correctly sized.

3.6.10 Adjust fan sheave until CFM is at or above design CFM. Provide additional sheaves and belts as required. Verify that motor is not overloaded.

3.6.11 Verify that HVAC control systems are fully operational.

3.7 Hydronic Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of HVAC pumps and piping systems.

3.7.1 Verify that the hydronic systems are properly flushed, filled, vented, purged and chemically treated and that all leaks are repaired. Verify proper air venting.

3.7.2 Verify that the correct strainer screens are clean and installed.

3.7.3 Verify that test ports, pressure gauges and thermometers are properly installed and are accessible at coils. Extensions to allow for pipe insulation are required.

3.7.4 Verify that HVAC control systems for AHUs and TUs are fully operational.

3.8 VAV Systems: The Contractor shall provide the following information to the Engineer to substantiate the proper start-up and preliminary adjustments of variable air volume boxes and control systems.

3.8.1 Verify that the digital controller properly modulates the chilled water control valve. Set controller to maintain the scheduled leaving air temperature. Verify that all heating coil controls are properly modulated.

3.9 Startup Report: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to

meet the written notice described herein prior to starting Commissioning and TAB work. Commissioning and TAB work will not start until the Startup Report has been submitted and approved.

END OF SECTION

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SECTION 15980 - OWNER TESTING AND BALANCING OF MECHANICAL SYSTEMS

All Test and Balance work shall be performed under a separate contract prepared by the Owner. The Contractor for this project shall coordinate with the Test and Balance contractor selected by the Owner. This coordination shall be processed through the Engineer. This coordination shall include, but not be limited to informing the Test and Balance contractor when all mechanical systems are installed and working properly, repairing or replacing all defects in the HVAC systems, replacing defective equipment and calibration of equipment as necessary where pointed out by the Test and Balance contractor. Work shall also include changing of motor sheaves as directed by the Test and Balance contractor to obtain proper air quantities.

The Contractor shall install all specified gauges, balancing valves, dampers, and other work required by the Contract Documents. The Contractor shall change all dirty filters where directed by the Test and Balance contractor.

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SECTION 15995 – HVAC SYSTEMS COMMISSIONING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Commissioning. Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. Ideally, this is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

Commissioning during the construction, acceptance, and warranty phase is intended to achieve the following specific objectives according to the Contract Documents:

1) Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.

2) Verify and document proper functional performance of equipment and systems.

3) Verify on-going proper performance persistence of systems under changing conditions throughout the first year of operation.

B. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

C. Abbreviations. The following are common abbreviations used in the *Specifications* and in the *Commissioning Plan.*

A/E- Architect and/or design engineers
CA- Commissioning authority
CC- Controls contractor
Cx- Commissioning
Cx Plan- Commissioning Plan document
EC- Electrical contractor
TAB- Test and balance contractor
FT- Functional performance test
GC- General Contractor (prime)
MC- Mechanical contractor
PC- Prefunctional checklist
PM- Project manager (of the Owner)
Subs- Subcontractors to General

1.2 COORDINATION

A. Commissioning Team. The members of the commissioning team consist of the Commissioning Authority (CA), the owner's Project Manager (PM), the General Contractor (GC or Contractor), the Mechanical Engineer (ME), the Mechanical Contractor (MC), the Electrical Contractor (EC), the TAB representative (TAB), the Controls Contractor (CC), any other installing subcontractors or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.

For this project since the 'Prime' Contractor (the party holding direct contract to the Owner) is the Mechanical Contractor then all requirements and references to the General Contractor herein shall apply to the Mechanical Contractor.

B. Management. **For this project, the CA is hired directly by the Owner** and reports directly to the Owner with copy to the A/E on all correspondence and reports. The CA directs and coordinates the commissioning activities and reports to the A/E and the Owner's Project Manager (PM). All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents. The CA's responsibilities are the same regardless of who hired the CA.

C. Scheduling. The CA will work with the GC according to established protocols to schedule the commissioning activities. The CA will provide sufficient notice to the GC for scheduling commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

The CA will provide the initial schedule (or possibly just sequence) of primary commissioning events at the commissioning scoping meeting. The *Commissioning Plan—Construction Phase* provides a format for this schedule. As construction progresses more detailed schedules are developed by the CA. The Commissioning Plan also provides a format for detailed schedules.

1.3 COMMISSIONING PROCESS

A. Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process. After the initial commissioning scoping meeting the CA will complete the plan which is then considered the "final" construction phase commissioning plan, though it will continue to evolve and expand as the project progresses. The *Specifications* will take precedence over the *Commissioning Plan*.

B. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning during construction begins with a kickoff meeting conducted by the CA where the commissioning process is reviewed with the commissioning team members.

2. Additional meetings, if required throughout construction, will be scheduled by the CA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.

3. Equipment documentation is submitted to the CA during normal submittals for use in developing and finalizing project-specific Cx documentation.

4. The CA reviews the commissioned equipment submittals for compliance with contract requirements as well as for aspects related to commissioning and owner maintenance.

5. The CA develops prefunctional checklists to be completed for systems and equipment to be commissioned during the equipment startup and check-out process. These checklists are intended to augment, not replace, the manufacturer's standard start-up / checkout documentation.

6. The CA and the Subs work together to execute and document the prefunctional checklists and perform startup and initial checkout. In general the CA will complete the installation checks portion of the prefunctional checklists while the CA and the Subs will complete the equipment start-up / checkout portions. The CA documents that the checklists and startup were completed according to the approved plans.

7. The CA develops specific equipment and system functional performance test procedures.

8. The Controls Contractor sets up trending of system points and automated delivery of the trend reports as directed by CA. This data, if available prior to manual functional testing, is utilized to judge the readiness of systems to be tested.

9. The CA with the assistance of the TAB Contractor completes the Test, Adjust, Balance Verification (TAB-V) process. This must be successfully completed prior to beginning functional testing for each specific system.

10. The manual functional test procedures are executed by the Subs, under the direction of, and documented by the CA.

11. Items of non-compliance in material, installation or setup are corrected at the Sub's expense and the system retested.

12. Commissioning is substantially completed before Final Completion is granted to GC.

Warranty Period

1. For the duration of the Warranty Period the CA monitors the performance of the commissioned systems using the cloud-based Cx-PMOR system (BES+Tech Performance Plus). Any items identified by this monitoring shall be resolved through the Contract Warranty Process.

1.4 RESPONSIBILITIES

A. The responsibilities of various parties in the commissioning process are provided in this section. It is noted that the services for the Project Manager, Architect, HVAC mechanical and electrical designers/engineers, and Commissioning Authority are not provided for in this contract. That is, the Contractor is not responsible for providing their services as they are contracted separately with the Owner. Their responsibilities are listed here to clarify the commissioning process.

B. All Parties

1. Attend pre-commissioning meeting and normal construction period meetings, as deemed necessary by the CA, PM, and General Contractor to participate in the Cx Process.
2. Each company / organization identified as being a member of the Cx Team shall designate an employee who is involved and familiar with the project to be the point-of-contact (POC) for the Cx process.
3. The identified POC shall regularly review the on-line Issue Log at the BES Plus Tech website project portal and the report documents which are emailed to the Cx Team.
4. The POC shall respond to any and all issues assigned to the company / organization that they are representing in the Cx Process within five (5) working days of the date the issue is added to the Log. Failure by a construction team member to effectively participate in the Cx Process, as judged by the Owner, can be considered cause for holding a construction progress payment.

C. Architect / Engineer (or A/E)

Construction and Acceptance Phase

1. Attend the commissioning kickoff meeting and selected commissioning team meetings as required by the commissioning process.
2. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted.
3. Provide any design narrative documentation requested by the CA.
4. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
5. Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

Warranty Period

1. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.

D. Mechanical and Electrical Designers / Engineers (ME, EE – of the A/E)

Construction and Acceptance Phase

1. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as per scope of contract with Owner. One site observation should be completed just prior to system startup.
2. Provide any design narrative and sequences documentation requested by the CA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

3. Attend commissioning kickoff meeting and other selected commissioning team meetings if requested by the CA or PM.

4. Participate / assist in the resolution of system deficiencies identified during commissioning, according to the contract documents – particularly as it relates to design intent.

5. Review and approve the O&M manuals.

Warranty Period

1. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during warranty-period.

E. Commissioning Authority (CA)

The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving non- conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the A/E. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. At the direction and discretion of the CA, the Contractors will provide tools or the use of tools to start, check-out and functionally test equipment and systems.

Construction and Acceptance Phase

1. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

2. Coordinate the commissioning work and, with the GC, ensure that commissioning activities are being scheduled into the master schedule.

3. Plan and conduct a commissioning kickoff meeting and other commissioning meetings as required by the project.

4. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.

5. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.

6. During the process of preparing functional test procedures, review normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.

7. Write and distribute prefunctional tests and checklists.

8. Perform site visits, as necessary, to observe construction progress. Review construction meeting minutes for revisions / substitutions relating to the commissioning process. Assist in resolving any discrepancies.

9. Document equipment installation meets contract requirements by completion of the installation checks portion of the prefunctional checklists. Work together with Subs to complete the equipment start-up and check-out portion of the checklists. Approve prefunctional tests and checklist completion by reviewing prefunctional checklist reports and by selected site observation and spot checking.

10. Approve systems startup by reviewing start-up reports and by selected site observation.

11. Approve air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation (TAB Verification process).

12. With necessary assistance from installing contractors and design professionals, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone datalogger monitoring and manual functional testing.

13. Analyze any functional performance trend logs and monitoring data to verify performance as well as to confirm the readiness of systems for manual functional performance testing.

14. Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.

15. Maintain a master deficiency and resolution log (aka 'Issues Log') and a separate testing record.

16. Provide a final commissioning report (as described in this section).

Warranty Period

1. Configure and maintain the cloud-based Cx-PMOR performance monitoring system throughout the Warranty Period to identify performance and operational issues. Issues shall be documented using On-Going Issues Log and shall be corrected by way of the Contract Warranty Process.

2. Verify completion and effectiveness of required deficiency corrections for issues discovered during Warranty Period.

F. Owner's Project Manager (PM)

Construction and Acceptance Phase

1. Manage the contract of the CA, A/E, and of the GC.

2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Contract Documents.

3. Provide final approval for the completion of the commissioning work.

Warranty Period

1. Ensure that any seasonal or deferred testing and any deficiency issues are addressed.

G. General Contractor (GC)

Construction and Acceptance Phase

1. Facilitate the coordination of the commissioning work by the CA, and with the CA ensure that commissioning activities are being scheduled into the master schedule.
2. Include the cost of facilitating the commissioning process in the total contract price *(do NOT include the cost of the Commissioning Authority as they are under contract to the Owner).*
3. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CA.
4. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
5. Ensure that all Subs execute their commissioning responsibilities according to the Contract Documents and schedule.
6. A representative shall attend a commissioning kickoff meeting and other necessary meetings scheduled by the CA to facilitate the Cx process. Coordinate and require the attendance of required subcontractors at all Cx meetings as requested by the CA.
7. Coordinate the training of owner personnel in accordance to Contract Documents.
8. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the design sequences of operation to as-built conditions.

Warranty Period

1. Coordinate with and ensure that subcontractors complete deficiency corrections for issues discovered during Warranty Period.

H. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment testing per agreements with Subs and as required by individual equipment specification sections.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone data

logging equipment that may be used by the CA.

4. Through the contractors they supply products to, analyze specified products and verify that the designer has specified the newest most updated equipment reasonable for this project's scope and budget.

5. Provide information requested by CA regarding equipment sequence of operation and testing procedures.

6. Review test procedures for equipment installed by factory representatives.

I. Mechanical, Controls and TAB Contractors. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 15 are as follows (all references apply to commissioned equipment only):

Construction and Acceptance Phases

1. Include the cost of facilitating commissioning in the subcontract price *(do NOT include the cost of the Commissioning Authority as they are under contract to Owner).*

2. In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training requirements.

3. Attend a commissioning kickoff meeting and other meetings as deemed necessary by the CA and PM to facilitate the Cx process.

4. Contractors shall provide the CA with normal cut sheets and shop drawing submittals of commissioned equipment in print and digital PDF format.

5. Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.

    a. Typically this will include detailed manufacturer installation and start- up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent.

    b. The Commissioning Agent may request further documentation necessary for the commissioning process.

    c. This data request may be made prior to normal submittals.

6. Provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and use. O&M manuals shall be provided in print and digital PDF format.

7. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the

specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

8. Provide limited assistance to the CA in preparing the specific functional performance test procedures for the *Commissioning Plan – Construction Phase*.

10. Perform and clearly document all completed startup and system operational checkout procedures recommended by equipment manufacturers, providing a completed copy to the CA.

11. Address current A/E punch list items before functional testing. Air and water TAB shall be completed with discrepancies and problems remedied before manual functional testing of the respective air- or water-related systems.

12. Provide skilled technicians to execute starting of equipment and to execute the functional performance tests. Ensure that the technicians are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem- solving.

13. Provide skilled technicians to perform manual functional performance testing under the direction of the CA for specified equipment in the *Commissioning Plan* and Section 15995. Assist the CA in interpreting the monitoring data, as necessary.

14. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, PM and A/E and retest the equipment.

15. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

16. As specified elsewhere in the Contract Documents maintain as-built red- line drawings during construction for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).

17. Provide training of the Owner's operating staff using expert qualified personnel, as specified in the Contract Documents.

18. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

Warranty Period

1. If specified, execute seasonal or deferred manual functional performance testing, witnessed by the CA, according to the specifications.

2. Provide assistance to the CA as required to configure the Cx-PMOR performance monitoring system.

3. Correct deficiencies according to the contract warranty process and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing or through the Cx- PMOR system.

J. Mechanical Contractor. The responsibilities of the HVAC mechanical contractor, during construction and acceptance phases in addition to those listed above are:

1. Provide startup for all HVAC equipment, except for the building automation control system.

2. Assist and cooperate with the TAB contractor, Controls Contractor, and Commissioning Authority by:

   a. Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.

   b. Including cost of sheaves and belts that may be required by TAB.

   c. Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing.

      i. Provide factory fabricated, airtight, and non-corrosive test ports with screw cap and gasket equal to Ventlok type 699 at all locations where TAB Contractor shall make temperature, pressure, or velocity measurements. Mechanical Contractor shall coordinate location and quantity of TAB test ports with TAB Contractor.

      ii. The TAB Contractor shall permanently mark and identify the location points of the duct test ports with computer generated (DYMO type) labels. If the ducts have exterior insulation, these markings shall be made on the exterior side of the duct insulation. All test port locations shall be labeled corresponding to final TAB report.

   d. Providing pressure and / or temperature testing taps / ports (a.k.a. P/T ports) according to the Construction Documents to facilitate TAB and commissioning testing or as required based on specified testing procedures.

3. Install a P/T port at each water sensor (temperature or pressure) which is an analog input point to the control system. P/T port shall be located within six inches of the control system sensor.

4. List and clearly identify on the as-built drawings the locations of all air-flow stations.

5. Prepare a preliminary schedule for Division 15 pipe and duct system testing, flushing and cleaning, equipment start-up and TAB start and completion for use by the CA. Update the schedule as appropriate.

6. Be responsible to notify the PM or CA, ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the CA has the scheduling information needed to efficiently plan and execute the commissioning process.

K. Controls Contractor. The commissioning responsibilities of the controls contractor, during construction and acceptance phases in addition to those listed above are:

1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. It is the responsibility of the Controls Contractor to submit formal request for information to the Design Engineer if they feel they do not have sufficient information for a complete controls submittal or if they have reason to believe the control system if implemented as designed would result in an incomplete or functionally deficient system.

   Submittals shall be provided to the CA in print and digital PDF format, they shall include:

   a. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.

   b. All interactions and interlocks with other systems.

   c. Detailed delineation of control between any packaged controls and the building automation system, listing what points the BAS monitors only and what BAS points are control points and are adjustable.

   d. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).

   e. Start-up sequences.

   f. Warm-up mode sequences.

   g. Normal operating mode sequences.

   h. Unoccupied mode sequences.

   i. Shutdown sequences.

   j. Capacity control sequences and equipment staging.

   k. Temperature and pressure control: setbacks, setups, resets, etc.

   l. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.

   m. Effects of power or equipment failure with all standby component functions.

   n. Sequences for all alarms and emergency shut downs.

   o. Seasonal operational differences and recommendations.

   p. Organized by equipment / system the Contractor shall provide list of control system points to be trended and delivered to the Cx-PMOR system via automated email reporting. List shall include a general point name, point type, and interval of trend value sampling.

   q. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.

r. Equipment or system operating schedules, if known. At minimum provide description of each schedule that will be set up and what equipment / system is proposed to be connected to each schedule.

s. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.

2. Control Drawings Submittal

Submittals shall be provided to the CA in print and digital PDF format, they shall include:

a. The control drawings shall have a key to all abbreviations.

b. The control drawings shall contain graphic schematic depictions of the systems and each component.

c. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.

d. Provide a full points list with at least the following included for each point:

1) Controlled system

2) Point abbreviation

3) Point description

4) Display unit

5) Control point or setpoint (Yes / No)

6) Monitoring point (Yes / No)

7) Intermediate point (Yes / No)

8) Calculated point (Yes / No) Key:

Point Description: DB temp, airflow, etc.

Control or Setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.)

Intermediate Point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).

Monitoring Point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.

Calculated Point: "Virtual" point generated from calculations of other point values.

The Controls Contractor shall keep the CA informed of all changes to this list

during programming and setup.

3. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.

4. Assist and cooperate with the TAB contractor in the following manner:

   a. Meet with the TAB contractor prior to beginning TAB to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (software to be installed on TAB contractor PC, handheld control system interface for use around the building during TAB, etc.).

   b. For a given area, have all required control system checks, calibrations, and startup of the system completed and approved by the CA prior to TAB.

   c. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.

5. Assist and cooperate with the CA in the following manner:

   a. Provide a skilled technician who is familiar with this building and the installed control system components to execute the manual functional testing of the controls system as directed by the CA.

   b. Set up and execute all control system trend logs specified in the *Commissioning Plan* or as requested by the CA.

6. The controls contractor shall prepare a written plan indicating in a step-by- step manner, the procedures that will be followed to test, checkout and adjust the control system prior to functional performance testing,
according to the process in Section 15995. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:

   a. System name.

   b. List of devices.

   c. Step-by-step procedures for testing each controller after installation, including:

      1) Process of verifying proper hardware and wiring installation.

      2) Process of downloading programs to local controllers and verifying that they are addressed correctly.

      3) Process of performing operational checks of each controlled component.

      4) Plan and process for calibrating valve and damper actuators and all sensors.

      5) A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside

of expected values.

d. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has "passed" and is operating within the contract parameters.

e. A description of the instrumentation required for testing.

f. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the CA and TAB contractor for this determination.

7. Provide a signed and dated certification to the CA and PM upon completion of the checkout of each controlled device, equipment and system prior to manual functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.

8. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as required to implement the full sequence of control as specified in the Contract Documents.

9. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).

10. System Data Trending & Reporting Detailed Requirements. The Controls Contractor for this project shall provide automated data reporting through the building automation system which shall deliver system operating data and utility consumption data *(if available)* daily to the Cx-PMOR system via trend reports which are automatically emailed to the Cx-PMOR system. The complete cost for the Controls Contractor to set up ALL required trending and reporting shall be included in the project contract cost.

a. Trend reports shall be emailed to the Cx-PMOR server on a daily basis between 12am and 6am.

b. The duration of each trend report shall include at least the entire previous day's (e.g. midnight to midnight) data. Optionally, the report could be required to include the previous three days' data so that 1-2 days of missing reports could be made up by the subsequent report. The reports shall NEVER include more than a maximum five days data. The CA shall provide direction as to the desired duration.

c. All required system operating data trends shall report the instantaneous value of the data point being trended at 15-minute intervals unless specifically directed otherwise by the CA. The trend sampling interval for each data point must be consistent, e.g. data cannot start at a five-minute interval and then change to a fifteen-minute interval.

d. All utility consumption data (kWh, ton-hr, btu, etc.) trends shall report the accumulated consumption across the interval period (e.g. electrical consumption, kWh, total for the 15-minute period) and shall not report total accumulating consumption. Demand shall be calculated as a virtual point by the Cx-PMOR analysis system. If this is not possible then the instantaneous 15-min demand shall be reported and the consumption shall be calculated as a virtual point by the Cx-PMOR system.

e. The Contractor shall submit their proposed trending file format to the CA for approval prior to implementing for all requested trend points (CSV or XLS files are preferred format however PDF may also be acceptable). Once approved and set up the trend file formatting shall NOT change from one report to the next. If trend formatting changes due to software upgrade then the Contractor shall be required to compensate CA for any changes required to the PMOR system configuration to accept the new data formatting.

f. The following data point naming convention shall be utilized for all trend reports and for the subject line of emails delivering the automated report:
< building name >.< system name >.<point name>
i. All data point names must be unique from other points in the same project.

g. Minimum Required Monitoring Points:
i. The final list of points to be monitored will be furnished by CA to the Controls Contractor after the building automation system submittal has been reviewed.
ii. A formal trend request document will be provided to the Controls Contractor with the monitored points list and this same document shall be completed and returned to the CA as proof that set-up has been completed.

L. TAB Contractor. The duties of the TAB contractor, in addition to those listed in (A) are:

1. Prior to starting TAB, submit to the PM the qualifications of the site technician for the project, including the name of the contractors and facility managers of recent projects the technician on which was lead. The
Owner will approve the site technician's qualifications for this project.

2. Submit the outline of the TAB plan and approach for each system and component to the CA, PM and the controls contractor six weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system.

3. The submitted plan will include: *(as applicable to specific systems included in project)*

a. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to

sufficiently understand the design intent for each system.

b. An explanation of the intended use of the building control system. The controls contractor will comment on feasibility of the plan.

c. All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.

d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.

e. Final test report forms to be used.

f. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the water side.

g. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.

h. Details of how *total* flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: pump curves, circuit setter, flow station, ultrasonic, etc.).

i. The identification and types of measurement instruments to be used and their most recent calibration date.

j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.

k. Confirmation that TAB understands the outside air ventilation criteria under all conditions.

l. Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).

m. Details of how building static and exhaust fan / relief damper capacity will be checked.

n. Proposed selection points for sound measurements and sound measurement methods.

o. Details of methods for making any specified coil or other system plant capacity measurements.

p. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.

q. Details regarding specified deferred or seasonal TAB work.

r. Details of any specified false loading of systems to complete TAB work.

s. Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.

t. Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).

u. Plan for formal progress reports (scope and frequency).

v. Plan for formal deficiency reports (scope, frequency and distribution).

4. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the CA and PM at least twice a week.

5. Communicate in writing to the controls contractor all setpoint and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.

6. Provide a draft TAB report within two weeks of completion. A copy will be provided to the CA. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.

7. Provide the CA with any requested data, gathered, but not shown on the draft reports.

8. Provide a final TAB report for the CA with details, as in the draft.

9. Conduct functional performance tests and checks (a.k.a. 'Tab Verification Process) on the original TAB as specified for TAB in the *Commissioning Plan – Construction Phase*. Tab Verification shall consist of repeating measurements made during the original TAB procedures and comparing results against that of the submitted TAB report as well as the design parameters. Sampling rate (if applicable) and acceptance criteria shall be as defined in the *Commissioning Plan*.

1.5 DEFINITIONS

Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

Architect / Engineer (A/E) - the prime consultant (architect) and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

Basis of Design (BOD)- The basis of design is the documentation of the primary thought

processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent. Some reiterating of the design intent may be included. The document records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

Commissioning authority (CA) - an independent agent, not otherwise associated with the A/E team members or the Contractor. The CA directs and coordinates the day-to-day commissioning activities. The CA does not take an oversight role like the GC. Regardless of to whom the CA is contracted, the CA shall report directly to the Owner's Project Manager (PM) with copy to the party holding their Commissioning Contract.

Commissioning Plan - an overall plan, developed before or after bidding, that provides the structure, schedule and coordination planning for the commissioning process.

Contract Documents - the documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, *Cx Plan*, etc.).

Contractor - the general contractor or authorized representative.

Control system - the central building energy management control system. Cx-

PMOR –see PMOR

Datalogging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.

Deferred Functional Tests - FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).

Design Intent - a dynamic document that provides the explanation of the ideas, concepts and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.

Design Narrative or Design Documentation - sections of either the Design Intent or Basis of Design.

Factory Testing - testing of equipment on-site or at the factory by factory personnel with an Owner's representative present.

Functional Performance Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure set point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying

outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FTs are performed after prefunctional checklists and startup are complete.

General Contractor (GC) - the prime contractor for this project. Generally refers to all the GC's subcontractors as well. Also referred to as the Contractor, in some contexts.

Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

Non-Compliance - see Deficiency.

Non-Conformance - see Deficiency.

Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."

Owner-Contracted Tests - tests paid for by the Owner outside the GC's contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.

Owner's Project Requirements (OPR) - A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.

Performance Monitoring, Optimization, and Reporting (PMOR) – cloud based SaaS (Software as a Service) which provides automated building operating data acquisition, analysis, archival, and reporting by utilizing data provided from the building automation system to continually analyze and improve the overall performance of the building and its underlying mechanical and electrical systems.

Project Manager (PM) - the contracting and managing authority for the owner over the design and/or construction of the project, a staff position.

Sampling. - functionally testing only a fraction of the total number of identical or near

identical pieces of equipment. Refer to Section 15995, Part 3.6, F for details.

Seasonal Performance Tests - FT that are deferred until the system(s) will experience conditions closer to their design conditions.

Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.

Specifications - the construction specifications of the Contract Documents.

Startup - the initial starting or activating of dynamic equipment, including executing prefunctional checklists.

Subs - the subcontractors to the GC who provide and install building components and systems.

Test Procedures - the step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CA.

Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures.

Trending - monitoring using the building control system. Vendor -

supplier of equipment.

Warranty Period - warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

1.6 SYSTEMS TO BE COMMISSIONED

A. The following systems or equipment will be commissioned in this project.

Equipment and Systems

New water source heat pump outside air units

New chilled / hot water outside air unit

New chiller water / hot water pumps (in existing gymnasium systems)

New chilled / hot water piping systems (connected to existing systems)

All new (or modifications to existing) Building Automation System (BAS) work

Testing, Adjusting and Balancing Work (scope as specified in the Contract)

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and

required functional performance testing shall be provided by the Division contractor for the equipment being tested. For example, the mechanical contractor of Division 15 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 15, except for equipment specific to and used by TAB in their commissioning responsibilities. Two-way radios, when required, shall be provided by the Division Contractor.

B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and left on site, for the CA to use during functional testing, seasonal testing, and deferred testing. The equipment, tools, and instruments will be returned to the vendor / Subs after successful conclusion of the commissioning effort.

C. If requested, the controls contractor shall provide the CA with temporary software license to be loaded on the CA's computer, and any necessary network connection cables, for accessing the direct digital control system field panels for system testing. If available, the controls contractor shall provide a palm device with attachments, software, and cables, to check set point values of terminal device controllers. The controls contractor shall provide the CA with remote access method and username / password for remote connection to direct digital control system. All of the software, cables, and other items provided to the CA will be returned at the successful conclusion of the commissioning effort.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the *Specifications.* If not otherwise noted, the following minimum requirements shall apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5□F and a resolution of + or - 0.1□F. Humidity sensors shall have a certified calibration within the past 6 months and a resolution of +/- 1%. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.1 MEETINGS

A. Cx Kick-off Meeting. The CA will schedule, plan and conduct a meeting with the entire commissioning team in attendance. Information gathered from this meeting will allow the CA to complete the *Commissioning Plan* to its "final" version, which will also be distributed to all parties.

B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Subs. The CA will plan these meetings and will minimize unnecessary time being spent by Subs. For large projects, these meetings may be held monthly, until the final stages of construction when they may be held as frequently as one per week.

3.2 REPORTING

A. The CA may provide regular reports to the A/E and PM, depending on the management structure, with increasing frequency as construction and commissioning progresses. Standard forms may be provided and referenced in the *Commissioning Plan.*

B. The CA will regularly communicate with all members of the commissioning team (typically by means of email), keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.

C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

D. A final summary report by the CA will be provided to the A/E and PM, focusing on evaluating commissioning process issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report.

3.3 SUBMITTALS

A. The CA will provide appropriate contractors with a specific request for the type of submittal documentation the CA requires to facilitate the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the submittal will include the manufacturer and model number, the manufacturer's printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning authority. All documentation requested by the CA will be included by the Subs in their O&M manual contributions. *All submittal items required by the CA are required to be submitted both in printed format and in digital PDF format on a CD-ROM (or transmitted via email) for the CA's use.*

B. The Commissioning authority will review submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures and only secondarily to verify compliance with equipment specifications. The Commissioning authority will notify the PM or A/E as requested, of items missing or areas that are not in conformance with Contract Documents and which may require resubmission.

C. The CA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided with the Contract Specifications and Drawings.

D. These submittals to the CA do not constitute compliance for O&M manual

documentation. The O&M manuals are the responsibility of the Contractor.

3.4 START-UP, PREFUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned, according to Section 1.7, Systems to be Commissioned. Some systems that are not comprised so much of actual dynamic machinery and thus may have very simplified PCs and startup.

B. General. Prefunctional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

C. Start-up and Initial Checkout Plan. The CA shall assist the commissioning team members responsible for startup of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer- recommended procedures have been completed. Parties responsible for prefunctional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms. Parties responsible for executing functional performance tests are identified in the testing requirements outlined in the Commissioning Plan – Construction Phase.

1. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
2. These checklists and tests are provided by the CA to the Contractor. The CA will complete the installation checks portion of the checklists while the Subs will assist the CA in completing the equipment start-up and check- out portions. Most forms will have more than one trade responsible for its execution.
3. The CA may utilize some or all of a manufacturer's start-up documentation.

D. Sensor and Actuator Calibration.

All field-installed temperature, relative humidity, CO, CO2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if approved by the Owner before-hand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed *in* the unit at the factory with calibration certification provided need not be field calibrated.

All procedures used shall be fully documented on contractor provided checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.

Sensor Calibration Methods

All Sensors. Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable, are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.

Sensors Without Transmitters--Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument- measured value. If not, install offset in BAS, calibrate or replace sensor.

Sensors With Transmitters--Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance- temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or
maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat.
For pressure sensors, perform a similar process with a suitable signal generator.

Critical Applications. For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

Tolerances, Standard Applications

Sensor	Required Tolerance (±)	Sensor	Required Tolerance (±)
Cooling coil, Chilled & Condenser Water Temps	0.5F	Flow Rates, Water	5% of Design
AHU wet bulb & dew point	2.0F	Relative Humidity	5% of Design
Hot Water Coil and Boiler Water Temp	1.5F	Oxygen or CO2 Monitor	5% of Full Scale
Outside Air, Space Air, and Duct Temps	0.5F	Pressures, Air, Water, & Gas	5% of Design
Flow Rates, Air	5% of Design	Watthour, Voltage, & Amperage	3% of Design

Combustion Flue Temps 5.0F

The above stated tolerances shall be considered the most stringent required. Based on field conditions and the relative affect of a sensor to the operation of the system(s)the CA may choose to relax the above tolerances at his discretion subject to approval of the PM.

Valve and Damper Stroke Setup and Check EMS Readout. For all valve and damper actuator positions checked, verify the actual position against the BAS readout.

Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator.

Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. Restore to normal.

Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. Restore to normal.

E. Execution of Prefunctional Checklists and Startup.

1. Four weeks prior to startup, the Subs and vendors schedule startup and checkout with the General Contractor who will notify the CA. The performance of the prefunctional checklists, startup and checkout are directed and executed by the CA with the assistance of the Sub or vendor as required. The CA will primarily complete the installation checks portion of the checklists while the Subs will assist with the equipment start-up and check-out portion. When checking off prefunctional checklists, signatures may be required of other Subs for verification of completion of their work.
2. The Subs and vendors shall execute startup and provide the CA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
3. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The CA shall clearly list any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet.
2. The CA shall work with the Subs and vendors to correct and retest deficiencies or uncompleted items. The CA will involve the General Contractor and others as necessary. The installing Subs or vendors shall correct all areas that are deficient

or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA recommends approval of the execution of the checklists and startup of each system to the General Contractor using a standard form.

3.5 Cx PERFORMANCE MONITORING, OPTIMIZATION & REPORTING (Cx-PMOR)

A. Objectives and Scope.

1. This project will utilize a cloud-based SaaS (Software as a Service) commissioning, performance monitoring, optimization, and reporting (Cx-PMOR) system which is provided under the CA contracted scope of work. The system shall be utilized during three distinctive phases of the project: construction, acceptance, and warranty phase.

B. Construction Phase - System Readiness:

1. The Cx-PMOR system will be utilized prior to Functional Performance Testing in order to gauge the readiness of the systems to be tested.
2. At least 10 days prior to the scheduled start of functional testing the BAS shall have delivered two weeks of operating data to the Cx-PMOR system. If the building automation system communication capabilities are not complete sufficiently to enable the BAS to email trend reports then the Controls Contractor shall manually generate two weeks trend data to a report. This manual report shall be the SAME EXACT REPORT FORMAT as was prior approved and will be used for the permanent reporting (specified elsewhere herein). This manual report shall either be emailed to the CA or shall be emailed to the project's specific Cx-PMOR email account.
3. Following receipt of two weeks of operating data (either automatically or manual) the CA shall review the data utilizing the Cx-PMOR system to assess the readiness of the specific system to begin on-site functional testing.
4. The CA shall notify the project team of the any deficiencies identified by the trend data analysis that would need to be addressed prior to beginning functional testing.

C. Acceptance Phase – Post Functional Test Monitoring:

1. The Cx-PMOR system shall be utilized following on-site Functional Testing to assess dynamic operation stability and to ensure the systems operate properly under varying load conditions and occupancy modes. This is a limited length testing and is intended to be conducted for a short period (approximately two weeks) prior the completion of the formal functional testing.

2. Any deficiencies identified during this monitoring period shall be added to the project Commissioning Issue Log to be addressed by the Contractor as construction deficiencies. Some deficiencies identified by this monitoring may required supplemental on-site functional testing to be performed at the cost of the Contractor.

D. Warranty Phase – Monitoring:

1. The Cx-PMOR system will be utilized during the first year following substantial completion to monitor the performance of the building and the individual systems.
2. Any operational deficiency identified by the system will be documented using the system's online Issue Log and the deficiency will be resolved through the contract's Project Warranty process.
3. At eleven months following substantial completion the CA shall provide a comprehensive review of the system operation using the Cx-PMOR system to analyze the data provided from the BAS. An updated Warranty Phase Issue Log shall be generated and the Contractor shall resolve all issues determined by the team to be subject to Warranty requirements.
4. At the Owner's option, and additional cost, the services of the CA and the Cx-PMOR system may be utilized after the expiration of the Warranty Phase as an On-Going Commissioning process.

3.6 TEST, ADJUST, BALANCE (TAB) VERIFICATION (TAB-V)

A. TAB Agency shall provide labor and instruments to complete TAB Verification process with the Commissioning Agent. TAB Verification (TAB-V) shall be conducted to verify the contents of the Engineer-of-Record reviewed TAB Report. The verification shall include the following sampling rates and strategies:

1. VAV Calibration: a sample 20% of the total quantity of VAV terminal units, acceptable tolerance shall be +/- 10% between the measured total airflow and the airflow indicated by the DDC system. If more than 25% of the sample VAV require recalibration at the time of testing then another 10% of the total quantity of VAV shall be tested. *The TAB Agency may be responsible to pay for the additional trip(s) required of the Cx Professional to test additional VAV terminal units due to test failures on a time and material basis.*

2. Supply Air Balance: for those VAV which are randomly selected for VAV Calibration check, verify that supply air devices are balanced to +/- 10% of the design airflow

3. Exhaust Air Balance: ALL exhaust air devices (including fume hoods) on the project shall be verified to have airflows balanced to +/- 10% of the design airflow. Fume hood balance shall be verified based on face velocity through sash opening being not less than required velocity (- 0%) but not more than +10%.

4. Outside Air Flow Measurement Station Calibration: ALL outside air flow measurement stations shall be calibrated by the TAB Agency (with assistance of Controls Contractor). ALL flow measurement station calibrations shall be verified, +/- 10% between the measured total airflow and the airflow indicated by the DDC system.

5. Hot Water Flow Balance: a sample 20% of the total quantity of hot water heating coils, acceptable tolerance shall be +/- 10% between the measured hot water flow and the design water flow. If more than 25% of the sample coils require rebalancing at the time of testing then another 10% of the total quantity of coils shall be tested. *The TAB Agency may be responsible to pay for the additional trip(s) required of the Cx Professional to test additional coils due to test failures on a time and material basis.*

6. Chilled Water Flow Balance: ALL chilled water cooling coils on the project shall be verified, acceptable tolerance shall be +/- 10% between the measured chilled water flow and the design water flow.

3.7 FUNCTIONAL PERFORMANCE TESTING

A. This sub-section applies to all commissioning functional testing.

B. The general list of equipment to be commissioned is found in Section 15995, Part 1.7.

C. The parties responsible to execute each test are listed with each test in the *Commissioning Plan – Construction Phase*.

D. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this project are given in the *Commissioning Plan – Construction Phase.*

E. Development of Test Procedures. Before test procedures are written, the CA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. The CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Sub or vendor responsible to execute a test, shall provide limited assistance to the CA in developing the procedures review (answering questions about equipment, operation,

sequences, etc.). Prior to execution, the CA shall provide a copy of the test procedures to the Sub(s) who shall review the tests for feasibility, safety, equipment and warranty protection. The CA may submit the tests to the PM or A/E for review, if requested.

The CA shall review owner-contracted, factory testing or required owner acceptance tests which the CA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the *Specifications*. Redundancy of testing shall be minimized.

The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

The test procedure forms developed by the CA may include (but not be limited to) the following information:

1. System and equipment or component name(s)
2. Equipment location and ID number
3. Unique test ID number, and reference to unique prefunctional checklist and start-up documentation ID numbers for the piece of equipment
4. Date
5. Project name
6. Participating parties
7. A copy of the specific sequence of operations or other specified parameters being verified
8. Formulas used in any calculations
9. Required pre-test field measurements
10. Instructions for setting up the test.
11. Special cautions, alarm limits, etc.
12. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
13. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
14. A section for comments
15. Signatures and date block for the CA

F. Test Methods.

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone dataloggers. The CA will determine which method is most appropriate for tests that do not have a method specified.
2. Simulated Conditions. Simulating conditions (not by an overwritten value) shall

be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.

3. Overwritten Values. Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate set point to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.

5. Altering Setpoints. Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55F, when the outside air temperature is above 55F, temporarily change the lockout setpoint to be 2F above the current outside air temperature.

6. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during prefunctional testing.

7. Setup. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Sub executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Sub shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.

8. Sampling. Multiple identical pieces of non-life-safety or otherwise non- critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. The specific recommended sampling rates are specified in the *Commissioning Plan – Construction Phase*. It is noted that no sampling by Subs is allowed in prefunctional checklist execution.

   A common sampling strategy referenced in the *Specifications* as the "xx% Sampling—yy% Failure Rule" is defined by the following example.

   xx = the percent of the group of identical equipment to be included in each sample.

yy = the percent of the sample that if failing, will require another sample to be tested.

The example below describes a 20% Sampling—10% Failure Rule.

a. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the "first sample."

b. If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).

c. If 10% of the units in the second sample fail, test all remaining units in the whole group.

d. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

The above Sampling – Failure procedures may be modified by the CA at his discretion with agreement by the PM based upon specific reasons for a test failure versus affect of specific test on the system performance as a whole.

G. Coordination and Scheduling. The Subs shall provide sufficient notice to the CA regarding their completion schedule for the prefunctional checklists and startup of all equipment and systems. The CA will schedule functional tests through the GC and affected Subs. The CA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.

In general, functional testing is conducted after equipment startup and checkout has been satisfactorily completed. The control system is sufficiently tested and approved by the CA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

H. Test Equipment. Refer to Section 15995, Part 2 for test equipment requirements.

I. Problem Solving. The CA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subs and A/E.

3.8 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation. The CA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the PM for review and approval and to the Subs for review. The CA will include the filled out forms in an Appendix to the

Commissioning Summary Report.

B. Non-Conformance.

1. The CA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the PM and A/E on a standard non-compliance form or through the use of an Issues Log.

2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will be documented on the procedure form.

3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the PM.

4. As tests progress and a deficiency is identified, the CA discusses the issue with the executing contractor.

   a. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:

      1) The CA documents the deficiency on the Cx Issue Log and the Sub's response and intentions and they go on to another test or sequence. Once the Sub corrects the deficiency they notify the CA who will retest or check as required to determine the deficiency has been corrected and will update the status of the deficiency on the Cx Issue Log.

   b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

      1) The deficiency shall be documented on the Cx Issue Log with the Sub's response and a copy given to the GC and to the Sub representative assumed to be responsible.

      2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Project Manager.

      3) The CA documents the resolution process using the Cx Issue Log.

      4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency and notifies the CA. The CA reschedules the test and the test is repeated until satisfactory performance is achieved.

5. Cost of Retesting.

   a. At the discretion of the CA, A/E, and the Owner, the cost for the *Sub* to retest a functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs

shall be negotiated with the GC.

b. For a deficiency identified, not related to any start-up or initial checkout fault, the following shall apply: The CA and PM will direct the retesting of the equipment once at no "charge" to the GC for their time. However, the CA's time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.

c. The time for the CA to direct any retesting required because a specific start-up or checkout item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the GC, who may choose to recover costs from the party responsible for executing the faulty prefunctional test.

d. Refer to the sampling section of Section 15995, Part 3.6 for requirements for testing and retesting identical equipment.

6. The Contractor shall respond in writing to the CA and PM at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

7. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the prime contractor.

C. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM or A/E. In such case, the Contractor shall provide the Owner with the following:

a. Within one week of notification from the A/E or PM, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the A/E and PM within two weeks of the original notice.

b. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

c. The A/E and PM will determine whether a replacement of all identical units or a repair is acceptable.

d. Two examples of the proposed solution will be installed by the Contractor and they will be allowed to test the installations for up to one week, after which the PM will decide whether to accept the solution.

e. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can

be obtained.

D. Approval. The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA and by the PM, if necessary. The CA recommends acceptance of each test to the PM.

3.9 COMMISSIONING RECORD DOCUMENTATION

B. Commissioning Summary Report and Related Documentation

1. Final Report Details. The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:

    1) Equipment meeting the equipment specifications,

    2) Equipment installation,

    3) Functional performance and efficiency,

    4) Equipment documentation and design intent, and

    5) Operator training.

    All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

3.10 TRAINING OF OWNER PERSONNEL

A. The General Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed, refer to other project specification sections for detailed requirements. For this project the CA will not be involved in preparing, approving, or executing training content nor scheduling of training.

3.11 WRITTEN WORK PRODUCTS

A. The commissioning process generates a number of written work products described in various parts of the *Specifications.* The *Commissioning Plan— Construction Phase,* lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and the location of the specification to create them. In summary, the written products are:

Product		Developed By
1.	Final commissioning plan	CA
2.	Cx Meeting minutes	CA
3.	Commissioning schedules	CA with GC
4.	Equipment documentation submittals	Subs
5.	Sequence clarifications	Subs and A/E as needed
6.	Startup and initial checkout	Subs
7.	Final TAB report	TAB
8.	Issues Log (deficiencies)	CA
9.	Commissioning Progress Record	CA
10.	Functional test forms	CA
11.	Filled out functional tests	CA
12.	O&M manuals	Subs
13.	Overall training plan	Subs
14.	Specific training agendas	Subs
15.	Final commissioning report	CA

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SECTION 16000 – ELECTRICAL

1. RELATED DOCUMENTS: The Electrical General Requirements are supplementing and applicable to Division 16 Sections and shall apply to all phases of work specified herein, shown on the Drawings, or required to provide a complete installation of electrical systems. Section 16 is sub-divided for convenience only. Associated work specified in other Sections:

16100 - Electrical Methods and Basic Materials
16200 - Raceway Systems
16300 - Wire, Cable and Devices
16400 - Service and Distribution
16500 - Lighting
16680 - Transient Voltage Surge Suppression System
16721 – Multiplexed Intelligent Fire Alarm System
16760 - Intercom System

2. JOB CONDITIONS:

A. SITE INSPECTIONS: Before submitting proposals, each bidder should visit the site and fully familiarize himself with all job conditions and shall be fully informed as to the extent of his work. No consideration will be given after bid opening date for alleged misunderstanding as to the requirements of work involved in connecting to the utilities or as to requirements of materials to be furnished.

B. EXISTING CONDITIONS: All utilities, existing system and conditions shown on the plans as existing are approximate, and the Contractor shall verify before any work is started.

C. SCHEDULED INTERRUPTIONS: Planned interruptions of utilities service, to any facility affected by this contract, shall be carefully planned and approved by Engineer at least ten (10) days in advance of the requested interruption. The Contractor shall not interrupt services until the Engineer has granted specific approval. The request shall indicate services to be affected, date and time of interruption and duration of outage. Request for interruption of service will not be approved until all equipment and materials required for the completion of that particular phase of work are on the job site. The work may have to be scheduled after normal working hours.

D. ACCIDENTAL INTERRUPTIONS: All excavation and/or remodeling work required shall be performed with care so as not to interrupt other existing services (water, gas, electrical, sewer, sprinklers, etc.). If accidental utility interruption resulting from work performed by the Contractor occurs, service shall be immediately restored to its original condition without delay, by and at the expense of the Contractor, using skilled workmen of the trade required.

E. MAINTAINING SERVICE:

(1) Any existing service (or operating system) which must be interrupted for any length of time shall be supplied with a temporary service if necessary for continuation of the normal operation of this facility.

(2) Any existing system or part of an existing system currently in operation shall remain so after all additions or renovations are made and all work is complete.

3. REGULATORY REQUIREMENTS:

A. CODES, PERMITS AND INSPECTIONS: The installation shall comply with all state and federal laws and ordinances applicable to electrical installation and with the regulations of the latest published edition of the National Electric Code where such regulations do not conflict with those laws and ordinances. The Contractor shall obtain permits, and after completion of the work, shall furnish the Architect a certificate of final inspection and approval from the applicable local inspection department. For Schools: The installation shall comply with all state and federal laws and ordinances applicable to electrical installation and with the regulations of the latest published edition of the National Electric Code. The installation shall also conform to the latest published edition of State Requirements for Educational Facilities (SREF).

B. DRAWINGS AND SPECIFICATIONS: The drawings and these specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both. Omissions from the drawings and specifications of details of work which are evidently necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the Contractor from performing such work. In any case of discrepancy in the figures or catalog numbers, the matter shall be submitted to the Architect, who shall promptly make a determination in writing. Any adjustment by the Contractor shall be at the Contractor's own risk and expense. Electrical drawings are diagrammatic only. Do not scale these drawings. All equipment shall be installed in accordance with manufacturer's recommendations and any conflicting data shall be verified before bidding.

4. SYSTEMS COORDINATION AND COOPERATION:

A. INTERFACING WITH OTHER CRAFTS: It shall be the responsibility of the Contractor to cooperate and coordinate with all other crafts working on this project. This Contractor shall do all cutting, trenching, backfill and structural removals to permit entry of the electrical system components. The General Contractor shall do all patching and finishing. The Architect's representative shall render a decision in writing as to space allotment in congested areas. No claims for "extras" due to such decisions shall be allowed, even though the work has already been installed. When the Contractor submits for approval any item or equipment, he shall determine for himself whether or not it will fit the space provided. If, after installation of any equipment, wiring or other items, it is determined that ample maintenance or passage space has not been provided, then the Contractor shall rearrange this work and/or furnish other equipment even though the equipment installed has been approved. A 1/2" = 1'0" scaled drawing of all electrical rooms and rooms containing electrical panels shall be submitted 10 calendar days prior to bid for approval by the Engineer of Record and submitted again with the electrical shop drawings showing the proposed location of all equipment in each room. The Contractor shall verify that all electrical panels have clearances required by code and thickness of walls are adequate for all flush mounted panels. SPACE ALLOCATION IN THESE ROOMS IS CRITICAL. ALSO SUBMIT ELEVATIONS OF EACH MAJOR WALL.

B. EQUIPMENT FURNISHED UNDER OTHER SECTIONS: This Contractor shall furnish and install, complete electrical roughing-in and connections to all equipment furnished under other sections and as indicated on drawings. THIS INCLUDES ALL OUTLETS, PULL BOXES, HANDHOLES, CONDUIT, LADDER RACEWAY, SURFACE RACEWAYS, AND PULLSTRING AS SHOWN ON MECHANICAL, ELECTRICAL, FIRE ALARM, INTERCOM, AND TELECOMMUNICATIONS/STRUCTURED CABLING DRAWINGS. All such equipment shall be set in place as work of other sections.

C. HEATING AND AIR CONDITIONING:

(1) The Contractor shall furnish all branch circuit wiring to motors and control panels or centers including disconnects, receptacles, switches, and appurtenances to which the system at the units may be connected, to provide a complete system of wiring for power. Control equipment and control circuit wiring is specified in the Mechanical Section.

(2) Control devices to be included in the branch circuit, except those furnished integral with the equipment, will be delivered by the Heating and Air Conditioning Contractor and installed by the Electrical Contractor.

5. WORKMANSHIP: All work shall be executed in a neat and substantial manner by skilled workman, well qualified, and regularly engaged in the type of work required. Substandard work shall be removed and replaced by the Contractor at no cost to the Owner.

6. APPROVAL OF MATERIALS AND EQUIPMENT:

A. PRIOR-SUBMITTALS: The Contractor shall base his proposal on the materials specified herein and on the drawings. Reference to a particular product by manufacturer, trade name, or catalog number establishes the quality standards of material and equipment required for this installation and is not intended to exclude products equal in quality and similar design. The Engineer of Record reserves the sole right to decide the equality of materials proposed for use in lieu of these specified. It shall be the Contractor's responsibility to furnish the information and data sufficient to establish the quality and utility of the items in question, including furnishing of samples if required. If other equipment manufacturers determine that their equipment will fit in the space and meet the recommended clearances, suit all job conditions, equal or exceed the quality of the specified items, then a request may be made in writing to the Architect at least ten (10) days prior to bid date for permission to be included in the approved equipment list. All data required for evaluation shall accompany the above letter.

B. SUBMITTALS:

(1) Shop Drawings: The Contractor shall submit a list of items proposed for use. He shall also submit catalog data and shop drawings on proposed systems and their components, panelboards, safety switches, starters and contactors, transformers, lighting fixtures, and wiring devices. Where substitutions alter the design or space requirements, the Contractor shall defray all items of cost for the revised design and construction including costs to all allied trades involved. Data shall be submitted

within thirty (30) days after the contract is awarded. Provide six (6) copies of shop drawings as a minimum unless the General Conditions requires a greater number of copies. Each submittal data section shall be covered with an index sheet listing Contractor, supplier, etc., and an index to the enclosed submittals.

(2) As-Built Drawings: Upon completion of the project, the Contractor shall furnish a complete set of the drawings which formed a part of the contract and include all revisions, sketches, etc., which may have been required during the construction.

(3) Operating and Maintenance Manuals: At completion of the work, furnish three (3) copies of written operation instructions which shall include manufacturer's descriptive bulletins, operating and maintenance manuals and parts lists of all equipment installed. Also include in such instructions, the specified size and capacity ratings of all equipment installed. Each set of instructions shall be assembled into a suitable loose-leaf type binder and presented to the Architect for delivery to the Owner.

(4) Each major section of submittals such as power, equipment, lighting equipment, fire alarm, etc., shall be secured in a booklet or stapled with a covering index which lists the following information:

a. General contractor w/phone number and project manager.

b. Sub-contractor w/phone number and project manager.

c. Supplier of equipment w/phone number and person responsible for this project.

d. Index of each item covered in submittal and model number.

e. Any deviation from contract documents shall be specifically noted on submittal cover index and boldly on specific submittal sheet.

(5) ELECTRICAL AND MECHANICAL/PLUMBING EQUIPMENT COORDINATION:

The electrical power equipment submittals shall be accompanied by a letter verifying coordination of electrical services for all mechanical and plumbing equipment requiring power. The letter shall follow the format listed below.

To: _____
(General Contractor)

Re: _____
(Project name and location)

We the undersigned subcontractors certify that we have coordinated the electrical requirements for mechanical and plumbing equipment as evidenced by the coordination chart listed herein.

Item	Load full load amps	1 phase or 3 phase	number of electrical connections	max overcurr protection	min overcurr protection	breaker proposed	circuit proposed

The above list details all required electrical connections for mechanical equipment.

Signed: _____

For: _____
Mechanical Subcontractor

The above list details all required electrical connections for plumbing equipment.

Signed: _____

For: _____
Plumbing Subcontractor

The above list of equipment has been reviewed and the required connections are being provided. (Any exceptions or request for direction shall be listed here)

Signed: _____

For: _____
Electrical Subcontractor

7. PRODUCT DELIVERY, STORAGE AND HANDLING

A. PROTECTION: Take necessary precautions to protect all material, equipment, apparatus and work from damage. Failure to do so to the satisfaction of the Architect will be sufficient cause for the rejection of the material, equipment or work in question. Contractor is responsible for the safety and good condition of the materials installed until final acceptance by the owner.

B. CLEANING: Conduit openings shall be capped or plugged during installation. Fixtures and equipment shall be tightly covered and protected against dirt, moisture, chemical and mechanical injury. At the completion of the work the fixtures, material and equipment shall be thoroughly cleaned and delivered in condition satisfactory to the Architect.

C. DISPOSAL OF EXISTING ELECTRICAL EQUIPMENT: Existing circuit breakers from equipment (panelboards, switchboards, etc.) shall have circuit breakers removed, stored and protected from environment, and delivered to the Electrical Maintenance Shop at 30 East Texar Drive, Pensacola, Florida. The School District Electronics shop shall have first right of refusal to any electronics equipment, including all intercom system and all fire alarm system equipment and devices, removed from the existing school facilities.

8. TESTING AND BALANCING: Make tests that may be required by the Owner or the Architect in connection with the operation of the electrical system in the buildings. Balance all single-phase loads connected to all panelboards in the buildings to insure approximate equal divisions of these loads on the main secondary power supply serving the buildings. All tests shall be made in accordance with the latest standards of the IEEE and the NEC. The installation shall be tested for performance, grounds and insulation resistance. A "megger" type instrument shall be used. Contractor shall perform circuit continuity and operational tests on all equipment furnished or connected by Contractor. The tests shall be made in the presence of the Architect or his representative. The Contractor shall notify the Architect at least twenty-four (24) hours in advance of tests. The Contractor shall provide all testing equipment and all costs shall be borne by him. Written reports shall be made of all tests. All faults shall be corrected immediately.

A letter shall be written giving the following:

A. Measured amps on each phase of each panel.

B. Resistance to ground of each grounding electrode.

C. Measured voltage phase to phase and phase to neutral at each panel.

D. Ground continuity and polarity instrument used.

9. OPERATING AND MAINTENANCE INSTRUCTIONS/AS BUILT DRAWINGS:

A. Four (4) complete sets of instructions containing the manufacturer’s operating and maintenance instructions for each piece of equipment shall be furnished to the Owner. Each

set shall be permanently bound and shall have a hard cover. One complete set shall be furnished at the time that the test procedure is submitted, and remaining sets shall be furnished before the Contract is completed. Flysheets shall be placed before instructions covering each subject. The instruction sheets shall be approximately 8-1/2" by 11" with large sheets of Drawings folded in. The instructions shall include information for major pieces of equipment and systems.

B. Upon completion of the work and at the time designated, the services of one project engineer shall be provided by the Contractor to instruct the representative of the Owner in the operation and maintenance of the systems.

C. This Contractor shall provide as-built Drawings at the completion of the job. Drawings shall show all significant changes in equipment, wiring, routing, location, etc. All underground conduit routing shall be accurately indicated with locations dimensioned.

10. GUARANTEE AND SERVICE: Upon completion of all tests and acceptance, the Contractor shall furnish the Owner a written guarantee covering the electrical work done for a period of one (1) year from date of acceptance. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Upon notice from the Architect or the Owner, the Contractor shall, during the guarantee period, rectify and replace any defective material or workmanship and repair any damage caused thereby without additional cost.

END OF SECTION

SECTION 16100 – ELECTRICAL METHODS AND BASIC MATERIALS

I. GENERAL

1. SECTION INCLUDES:

A. SUPPORTS

B. EXCAVATION, TRENCHING, AND BACKFILLING

C. CUTTING AND PATCHING

D. EQUIPMENT CONNECTION

E. IDENTIFICATION OF EQUIPMENT

F. CLEANING AND PAINTING

II. PRODUCTS

1. SUPPORTS:

A. FRAMING STEEL: Galvanized or painted rolled steel of standard shapes and sizes.

B. MANUFACTURED CHANNEL: Hot dipped galvanized with all hardware required for mounting as manufactured by Unistrut, Steel City, or approved equal.

C. MISCELLANEOUS HARDWARE: Standard sizes treated for corrosion resistance.

2. IDENTIFICATION:

A. NAMEPLATES: Laminated black micarta with ¼" high engraved white letters.

B. PANEL DIRECTORIES: Typewritten under plastic cover in metal circuit directory holder permanently fastened to door by manufacturer.

C. WIRE AND CABLE MARKERS: Cloth, split sleeve, or tubing type.

III. EXECUTION

1. INSTALLATION

A. Products shall be installed in accordance with manufacturer's instructions.

B. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.

(1) Fasten hanger rods, conduit clamps, and outlet junction boxes to building structure using pre-cast insert system, expansion anchors, preset inserts, beam clamps, or spring steel clips.

(2) Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion and anchors on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

(3) Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.

(4) Do not use powder-actuated anchors.

(5) Do not drill structural steel members without written consent from the Architect.

(6) Fabricate supports from structural steel or steel channel.

(7) Install surface mounted cabinets and panel boards with minimum of four anchors.

(8) Provide steel channel supports to stand cabinets one inch off wall in wet locations.

(9) Bridge studs top and bottom with channels to support flush mounted cabinets and panel boards in stud walls.

C. Excavating, trenching, and backfilling shall be accomplished as indicated on the Drawings or where required to install systems and/or equipment.

(1) Trenches for all underground conduits or equipment shall be excavated to the required depths. Where soft, wet, or unstable soil is encountered, the bottom of the trench shall be filled with 6 inches of compacted gravel and sand fill. All trench bottoms shall be tamped hard. Trenches shall be shored as required to meet OSHA requirements and general safe working conditions.

(2) After conduits or equipment have been inspected and approved by the Architect and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall consist of the excavation, or borrow of sand, gravel, or other materials approved by the Architect and shall be free of trash, lumber or other debris. Backfill shall be placed in horizontal layers, not exceeding 9 inches in depth and properly moistened to approximate optimum requirements. Each layer shall be compacted by hand, or machine tamped to a density equivalent to surrounding soil. Backfill shall be brought to suitable elevation above ground to provide for anticipated settlement and shrinkage. All paving broken up shall be repaired and returned to the original condition.

(3) All underground conduits shall have an underground (metal foil) tape installed 12 inches above conduit identified as ELECTRICAL to aid in future location of conduit.

(4) All underground conduits shall have an underground red tape installed 12” above conduit.

D. CUTTING AND PATCHING: This Contractor shall provide all cutting, digging, etc., incident to his work and shall make all required repairs thereafter to the satisfaction of the Architect, but in no case shall the Contractor cut into any major structural element, beam, or column without written approval of the Architect.

(1) Pavements, sidewalks, roads, curbs, walls, ceilings, floors, and roofs shall be sawcut, patched, repaired and/or replaced as required to permit the installation of the electrical work. Existing concrete floors and other slabs, which require vertical piercing for installation of conduit raceways shall be neatly core drilled. The Contractor shall carefully lay out his drilling in advance and arrange it to minimize exposed work.

(2) The Contractor shall bear the expense of all cutting, patching, painting, repairing, or replacing of the work of other trades required because of his fault, error, or tardiness or because of any damage done by him.

(3) All patching, and finishing shall be performed by the General Contractor.

E. Make electrical connections to equipment in accordance with equipment manufacturer’s instructions.

(1) Verify that wiring and outlet rough-in work is complete and that equipment is ready for electrical connection, wiring, and being energized.

(2) Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.

(3) Install and connect disconnect switches, controllers, control stations, and control devices as indicated.

(4) Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.

(5) Install pre-fabricated cord set where connections with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.

(6) Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes.

F. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as specified herein.

(1) Degrease and clean surface to receive nameplates.

(2) Secure nameplates to equipment fronts using screws or rivets with edges parallel to equipment lines.

(3) Each new and existing panel shall have an external nameplate. Disconnect switches, starters or similar devices shall have a micarta engraved nameplate mechanically affixed with rivets indicating the load served and the location, such as "A/C 2" or "A/C 3 above ceiling". Letters shall be ¼" white on a black background. Panels shall be designated in this manner:

"Panel A
120/208 Volts
3 Phase 4 Wire
Served from Panel MP"

(4) Panel directories shall accurately indicate load served and location of load.

(5) Engrave plates as indicated on the Drawings.

G. Raceway junction boxes for each system shall be identified by painting the inside of the junction box cover for exposed work and both sides of the covers for concealed work according to the following code:

Receptacle Circuits	Black
120 V. Lighting Circuits	White
277 V. Lighting Circuits	Orange
208 or 240 V. Power & Misc.	Green
480 V. Power & Misc.	Brown
Fire Alarm System	Red
Intercom System	Yellow

If the established color code at this site conflicts with the above or other trades, the contractor shall so state in a letter outlining his proposed colors to maintain conformity

H. Install wire markers on each conductor in panel board gutters, boxes, and at load connections.

(1) Use distribution panel and branch circuit or feeder number to identify power and lighting circuits.

(2) Use control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings to identify control wiring.

I. Cleaning and Painting: The respective Contractors for the various phases of work shall clear away all debris, surplus materials, etc., resulting form their work or operations, leaving the job and equipment furnished in the clean first class condition.

(1) All fixtures and equipment shall be thoroughly cleaned of plaster, stickers, rust, stains and other foreign matter or discoloration, leaving every part in an acceptable condition ready for use.

(2) The Contractor shall refinish and restore to the original condition and appearance, all electrical equipment, which has sustained damage to manufacturer's prime and finish coats or enamel or paint. Materials and workmanship shall be equal to the requirements described for other painting.

END OF SECTION

SECTION: 16200 - RACEWAY SYSTEMS

I. GENERAL

1. SECTION INCLUDES:

A. CONDUIT AND CONDUIT FITTINGS

B. ELECTRICAL BOXES AND FITTINGS

C. WIREWAY

D. SERVICE FITTINGS

II. PRODUCTS

1. CONDUIT AND FITTINGS:

A. CONDUIT:

(1) Metal conduit: Galvanized steel.

(2) Metal tubing: Galvanized steel.

(3) Flexible Conduit: Steel.

(4) Liquid-tight Flexible Conduit: Flexible steel conduit with PVC jacket.

(5) Plastic Conduit and Tubing: NEMA TC 2; PVC. Use Schedule 40 conduit.

B. CONDUIT FITTINGS:

(1) Conduit Fittings and Conduit Bodies: NEMA FB 1. Conduit fittings shall be steel threaded type.

(2) Tubing Fittings: NEMA FB 1. Tubing fittings to be steel compression type for conduit up to 2" in diameter and set screw type for conduit 2-1/2" and larger.

(3) Flexible Conduit Fittings: NEMA FB 1. Flexible conduit fittings to be steel set screw or screw-in type.

(4) Liquid-tight Flexible Conduit Fittings: NEMA FB 1. Liquid-tight flexible conduit fittings shall be steel compression type.

(5) Plastic Fittings and Conduit Bodies: NEMA TC 3.

2. ELECTRICAL BOXES:

A. BOXES:

(1) Sheet Metal: NEMA OS 1; galvanized steel 4" or 4-11/16" square. Provide galvanized plaster/tile ring for recessed outlet boxes.

(2) Cast Metal: Aluminum or cast ferroalloy, deep type, gasketed cover, threaded hubs.

B. FLOOR BOXES for Installation in Cast-in-Place Concrete Floors: See electrical and telcom drawings for requirements.

C. LARGE ENCLOSURES: NEMA 250; Type 4, steel enclosures with manufacturer's standard enamel finish and cover, held closed screws.

D. LARGE CAST METAL BOXES:

(1) Surface-mounted Type: NEMA 250; Type 4 and Type 6, flat-flanged, surface mounted junction box; galvanized cast iron or cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

(2) Underground Type: NEMA 250; Type 4 flanged, recessed cover box for flush mounting; galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screw.

3. WIREWAY:

A. ENCLOSURE: General purpose or raintight type with knockouts.

B. COVER: Screw type with full gasketing.

C. FITTINGS: Lay-in type with removable cover and drip shield for outdoor installation.

D. FINISH: Rust inhibiting primer coating with enamel finish.

4. SERVICE FITTINGS:

A. FLUSH FLOOR BOX COVERS:

(1) Cover material: Brass.

(2) Duplex Convenience Receptacle: Duplex flap opening hinged with holding screw.

(3) Communications: 2-1/8" X 1" combination threaded opening.

(4) Provide brass finish protective rings and carpet flanges.

III. EXECUTION

1. EXAMINATION AND PREPARATION:

A. Examine supporting surfaces to determine that surfaces are ready to receive work.

B. Electrical boxes shown on Drawings are approximate locations unless dimensioned. Obtain verification from Architect of floor box locations and locations of outlets prior to rough-in. Outlets may be relocated to a distance of ten feet prior to rough-in with no additional cost to the Owner.

2. INSTALLATION:

A. Use conduit and tubing for raceways in the following locations:

(1) Underground Installations: Rigid steel conduit, painted with two coats of epoxy asphaltic paint or schedule 40 PVC.

(2) Installations in Concrete: Rigid steel conduit or rigid non-metallic conduit (schedule 40).

(3) Exposed Outdoor Locations: Rigid steel conduit or IMC.

(4) Wet Interior Locations: Rigid steel conduit, IMC, or electrical metallic tubing. Use threaded or raintight fittings for conduit.

(5) Concealed Dry Interior Locations: Rigid steel conduit or electrical metallic tubing.

(6) Exposed Dry Interior Locations: Rigid steel conduit or electrical metallic tubing.

(7) MC type cable is prohibited.

B. Size raceways for conductor type installed.

(1) Minimum Size Conduit: ¾" in underground locations, ½" in all other locations.

(2) Maximum Size Conduit in Slab Above Grade: 1 – inch; do not route conduits larger than ¾" to cross each other.

C. Arrange conduit and tubing to maintain headroom and to present a neat mechanical appearance.

(1) Route exposed raceway parallel and perpendicular to walls and adjacent piping.

(2) Maintain minimum 6 inch clearance to piping and 12 inch clearance to heat surfaces such as flues, steam piping, and heating appliances.

(3) Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings.

(4) Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.

(5) Group in parallel runs where practical. Use rack constructed of steel channel. Maintain spacing between raceways or de-rate circuit ampacities to NFPA 70 requirements.

(6) Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.

(7) Use conduit bodies to make sharp changes in direction.

(8) Terminate all conduits with insulated bushings.

(9) Use suitable caps to protect installed raceway against entrance of moisture and dirt.

(10) Provide a pull cord in all empty raceways.

(11) Install expansion joint fittings where raceway crosses building expansion joints.

(12) Install plastic conduit and tubing in strict accordance with the manufacturer's recommendations. When plastic conduit is installed, use galvanized rigid elbows for 90 degree bends.

D. Install electrical boxes as shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections and regulatory requirements.

(1) Use cast outlet box in exterior locations, wet locations, and exposed interior locations

(2) Use large enclosure for interior pull and junction boxes larger than 12 inches in any dimension.

(3) Locate and install electrical boxes to allow access. Provide access panels if required.

(4) Locate and install electrical boxes to maintain headroom and to present a neat mechanical appearance.

(5) Install pull boxes and junction boxes above accessible ceilings or in unfinished areas.

(6) Provide knockout closure for unused openings.

(7) Align wall-mounted outlet boxes plumb and level for switches, and similar devices.

(8) Coordinate mounting heights and locations of outlets above counters and backsplashes

(9) Install lighting outlets to locate luminaries as shown on the Drawings.

E. Use recessed outlet boxes in finished areas where indicated.

(1) Secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness, and plaster/tile ring installation.

(2) Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

(3) Locate boxes in masonry walls to require cutting corner only. Coordinate masonry cutting to achieve neat openings for boxes

(4) Do not install boxes back-to-back in walls; provide 6 inch separation, minimum. In acoustic-rated walls provide 24 inch separation minimum.

(5) Do not damage insulation.

F. Install wireway in accordance with manufacturer's instructions.

(1) Bolt wireway to wall using two-piece hangers or steel channels fastened to the wall or on a self-supporting structure. Install level.

(2) Mount raintight gutter in horizontal position only.

G. Install floor boxes in accordance with manufacturer's instructions.

(1) Set boxes level and flush with finish flooring material.

(2) Use adjustable cast floor boxes for all floor box installations.

H. Install service fittings in accordance with manufacturer's instructions.

I. Interface outlet boxes, service fittings, floor boxes, etc. with connection of equipment.

I. See Division 17 specifications for communications conduit and raceway systems requirements. All communications conduits shall be metal, of the type as described in these specifications unless noted otherwise in Division 17 specifications.

J. The Contractor shall be responsible for providing and installing all conduit and raceway systems for all systems including but not limited to lighting, power, fire alarm system, intercom system, communications systems, mechanical systems, and HVAC control systems. Coordinate location, quantities, sizes and requirements with respective contractor for such systems.

K. The Electrical Contractor shall refer to all telecommunications and mechanical drawings for electrical contractor specific notes and requirements.

L. All conduit and raceway systems in Multipurpose Rm. 801 shall be installed under the concrete slab or shall be routed concealed in walls or concealed in roof deck above exposed structure. Conduit and raceway systems shall not be surface mounted to exposed roof deck or panels visible from below. These conduits shall be installed within the roof deck system and in accordance with *The National Electrical Code.* Those conduits and raceway systems installed within the roof deck/panels shall be in the direction of the panels or channels within the panels. Coordinate with the architectural drawings and panels specified.

END OF SECTION

SECTION: 16300 - WIRE, CABLE, AND DEVICES

I. GENERAL

1. RELATED DOCUMENTS:

A. Section 16000 – Electrical General Requirements, apply to the work specified in this Section, with additions and modifications specified herein.

2. SECTION INCLUDES:

A. WIRE AND CABLE

B. WIRING DEVICES

II. PRODUCTS

1. WIRE AND CABLE:

A. BUILDING WIRE:

(1) Feeder and Branch Circuits 10 AWG and Smaller: Copper, solid conductor, 600 volt insulation, THHN/THWN.

(2) Feeder and Branch Circuits 8 AWG and 6 AWG: Copper, stranded conductor, 600 volt insulation, THHN/THWN.

(3) Feeder and Branch Circuit larger than 6 AWG: Copper, stranded, conductor, 600 volt insulation, THW.

(4) Control Circuits: Copper, stranded conductor, 600 volt insulation, THHN/THWN.

(5) Provide dedicated neutral conductors for all circuits. Shared neutrals shall be prohibited.

B. REMOTE CONTROL SIGNAL CABLE:

(1) Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 60 degree C, individual conductors twisted together, shielded, and covered with PVC jacket.

(2) Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together, shielded, and covered with PVC jacket; UL listed.

C. CORDS: Oil – resistant thermoset insulated multi – conductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp locations.

2. WIRING DEVICES AND WALLPLATES:

A. MANUFACTURERS:

(1) Hubbell.

(2) Legrand.

B. WALL SWITCHES: AC general use, quiet – operating snap switch rated 20 amperes and 120/277 volts AC, with plastic toggle handle.

(1) Single Pole Switch: Hubbell 1221

(2) Double Pole Switch: Hubbell 1222

(3) Three Way Switch: Hubbell 1223

(4) Four Way Switch : Hubbell 1224

(5) Pilot Light Type: Lighted handle, Model 1221-PL manufactured by Hubbell.

(6) Color: All devices shall be grey with stainless steel wall plates unless noted otherwise. Verify color with Architect during submittal review.

C. RECEPTACLE:

(1) Convenience Receptacle Configuration: Type 5-20R, plastic face. Model 5362 manufactured by Hubbell.

(2) Specific Purpose Receptacle: Configuration indicated on Drawings with black plastic face.

(3) Provide straight-blade receptacles to NEMA WD 1.

(4) Provide locking-blade receptacles to NEMA WD 5.

(5) GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter. Model GF-5362 manufactured by Hubbell.

(6) Color: All devices shall be grey with stainless steel wall plates unless noted otherwise. Verify color with Architect during submittal review.

D. WALL DIMMER: Slide dimmer for line voltage applications. See drawings for low voltage dimmer applications. Verify voltage. All devices shall be grey with stainless steel wall plates unless noted otherwise. Verify color with Architect during submittal review.

E. WEATHERPROOF COVER PLATE: Gasketed cast metal with hinged gasketed device covers rated raintight while in use in accordance with Article 410-57 of the National Electrical Code.

F. ATTACHMENT PLUG CAP: Match receptacle configuration provided for equipment connection.

G. CLOCKS: Battery operated Quartz clocks shall be provided as noted on the drawings. Clocks shall have a 12" dial, black gothic numerals and red sweep second hand. Clock shall operate on one or two AA batteries. The initial batteries shall be lead calcium.

H. WALLPLATES: Wallplates for all electrical wiring devices including but not limited to receptacles, switches, etc shall be specification grade 302 stainless steel. (This does not apply to wallplates for telecommunication outlets.)

III. EXECUTION:

1. EXAMINATION AND PREPERATION:

A. Verify that interior of building has been physically protected from weather.

B. Verify that mechanical work which is likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

2. INSTALLATION:

A. WIRING METHODS:

(1) Concealed Interior Locations: Building wire in raceway.

(2) Exposed Interior Locations: Building wire in raceway.

(3) Above Accessible Ceilings: Building wire in raceway.

(4) Wet or Damp Interior Locations: Building wire in raceway.

(5) Exterior Locations: Building wire in raceway.

(6) Underground Locations: Building wire in raceway.

B. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

(1) Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet; and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.

C. Neatly train and secure wiring inside boxes, equipment and panelboards.

D. Use UL listed wire pulling lubricant for pulling conductors in raceways.

E. Protect exposed cables.

F. Support cables above accessible ceilings to keep them from resting on ceiling tiles.

G. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.

H. Terminate spare conductors with electrical tape.

I. Devices shall mount flush or as indicated on the Drawings.

J. Install wiring devices in accordance with manufacturer's instructions.

(1) Install wall switches 48 inches above floor, "OFF" position down.

(2) Install wall dimmers 48 inches above floor. De-rate ganged dimmers as instructed by manufacturer. Do not use a common neutral, provide a separate neutral for each dimmed circuit.

(3) Install convenience receptacles 18 inches above floor, 6 inches above counters or splashbacks, with grounding pole on bottom. Verify typical mounting heights with Engineer prior to construction and field coordinate with telcom outlets. Advise the Engineer of any conflicts prior to rough-in.

(4) Install GFCI receptacles at all outdoor locations and all indoor locations as required by NFPA70, and as indicated.

(5) Install specific purpose receptacles at heights shown on Drawings.

(6) Install receptacles with ground pin up. For receptacles installed horizontally, install with neutral pin up.

K. Install wall plates flush and level.

(1) Install decorative plates on switch, receptacle, telephone, television and blank outlets in finished areas.

(2) Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

(3) Install weatherproof coverplates on all devices/boxes in wet or outdoor locations.

3. FIELD QUALITY CONTROL:

A. Perform field inspection and testing of circuits under provisions of Section 16000.

(1) Inspect wire and cables for physical damage and proper connection.

(2) Torque test conductor connections and terminations to manufacturer's recommended values.

(3) Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION

SECTION: 16400 - SERVICE AND DISTRIBUTION

I. GENERAL

1. SECTION INCLUDES:

A. GROUNDING AND BONDING

B. SERVICE ENTRANCE

C. UTILITY REQUIREMENTS

D. SWITCHBOARDS

E. PANELBOARDS

F. ENCLOSED SWITCHES

G. FUSES

H. CONTACTORS

2. SERVICE TYPE DESCRIPTION: Electric Service System shall be as indicated on drawings and served from an underground service lateral derived from a pad mounted transformer served by an underground primary service.

3. PROJECT CONDITIONS: Verify field measurements for the equipment to ensure proper fit within the space provided.

4. UTILITY REQUIREMENTS:

A. The serving utility is Gulf Power Company.

(1) The Owner will pay for all assessments, service charges, fees, etc. from the utility for service requirements.

5. EQUIPMENT APPLICATION: All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within those ratings and application shall be subject to any stipulations or exceptions established by the independent agency or laboratory. Use of equipment or materials in applications beyond that certified by the agency or beyond that recommended by the manufacturer shall be cause for removal and replacement of such misapplied items.

II. PRODUCTS

1. GROUNDING MATERIALS:

A. GROUND ROD: 16 feet x ¾" diameter, copper clad steel, sectional driven.

B. GROUND CONNECTORS: Approved ground clamp manufactured of cast bronze construction with matching bolts, nuts, and washers.

C. EXOTHERMIC WELDS: Materials shall be from the same source. Welding process shall be Cadweld or approved equal.

D. GROUNDING CONDUCTORS: Green colored and coded insulated copper (#12 AWG minimum) or bare soft drawn copper as indicated on Drawings.

2. SWITCHBOARD:

A. SWITCHBOARD: NEMA PB2.

(1) Line and Load Terminations: Accessible from the front only of switchboard, suitable for conductor materials used.

(2) Main Sections Devices: Individually mounted.

(3) Distribution Section Devices: Panel mounted

B. BUSSING:

(1) Bus Material: Tin-plated Copper sized in accordance with NEMA PB2.

(2) Bus Connections: Accessible from front for maintenance.

(3) Ground Bus: Copper.

C. ENCLOSURE: Type 1 General Purpose as shown on the Drawings.

(1) Align sections at rear.

(2) Height: 96 inches.

(3) Finish: Manufacturer's standard light gray enamel over external surfaces.

D. FUTURE PROVISIONS:

(1) Fully equip spaces for future devices with bussing and bus connection provisions; continuous current rating as indicated on the Drawings.

(2) Do not taper main bus rating.

E. SWITCHING AND OVER-CURRENT PROTECTION DEVICES:

(1) Molded Case Circuit Breakers: NEMA AB 1.

(2) Solid State Molded Case Circuit Breakers: NEMA AB 1; with electronic sensing, timing and tripping circuits for adjustable trip settings; ground fault trip; instantaneous trip and adjustable short time trip.

F. SWITCHBOARD INSTRUMENTS:

(1) Ammeter and Voltmeter: Mount in face of switchboard. Metering shall be Eaton Cutler-Hammer PXMP Energy Portal Module (EPM) Series with BACnet/IP or approved equal

(2) Load Monitoring Meters: Provide factory CTs, meters, wiring, etc integral to switchboards for sub-metering of various electrical loads (lighting, mechanical, etc). Meters shall be compatible with PXMP or approved equal. Provide all accessories required for a complete and functional installation such that the HVAC controls contractor has to provide only Ethernet cable to meters for monitoring.

G. PRIOR-APPROVAL SUBMITTALS:

(1) The pre-approved manufacturers listed below shall submit scaled shop drawings including plan views and elevations and data sheets of all switchboards to the Engineer of Record 10 calendar days prior to bid for approval. The submittals shall include but not be limited to all circuit breakers, customer metering, sub-metering, etc.

H. MANUFACTURERS:

(1) Square D Company

(2) Eaton Cutler – Hammer

(3) General Electric

3. PANELBOARDS:

A. DISTRIBUTION PANELBOARDS: NEMA PB 1; circuit breaker type.

(1) Bus Material: Tin-plated Copper.

(2) Ground Bus: Tin-plated Copper.

(3) Enclosures: Type 1 or 3R as shown on the Drawings.

(4) Mounting: Surface or flush mount as indicated on the Drawings.

(5) Door: Hinged with lock. Door assembly shall be hinged to enclosure for panels rated 250 amps or larger. All panels shall be door-in-door construction.

(6) Circuit Breakers: Bolt-on, ratings as shown on Drawings. Branch circuit breakers shall not be allowed in sub-feed positions.

(7) Mains: Main breakers shall be located in main position. Main breakers shall not be allowed in branch or sub-feed positions.

B. LIGHT AND POWER PANELBOARDS: NEMA PB 1; circuit breaker type.

(1) Bus Material: Tin-plated Copper.

(2) Ground Bus: Tin-plated Copper.

(3) Enclosures: Type 1 or 3R as shown on the Drawings.

(4) Mounting: Surface or flush mount as indicated on the Drawings.

(5) Door: Hinged with lock. All panels shall be door-in-door construction.

(6) Circuit Breakers: Bolt-on, ratings as shown on Drawings. Branch circuit breakers shall not be allowed in sub-feed positions.

(7) Mains: Main breakers shall be located in main position. Main breakers shall not be allowed in branch or sub-feed positions.

C. ACCESSORIES: Provide panel and branch device accessories as indicated on the Drawings

D. FUTURE PROVISIONS: Where space provisions are indicated on the Drawings, provide bussing, bus extensions, etc. required to mount future circuit breakers. Where spare provisions are indicated on the Drawings, provide circuit breakers complete and ready for connection.

E. MANUFACTURERS:

(1) Square D Company

(2) Eaton Cutler – Hammer

(3) General Electric

4. FUSES:

A. Service Entrance/Feeder Circuits – 600 Amp and smaller.

(1) U.L. Class RK1

(2) Current Limiting

(3) 200,000 amp RMS Interrupt Rating

(4) Voltage Rating: As required for system compatibility

B. Motor, Motor Controller, Transformer and Inductive Circuits.

(1) U.L. Class RD1, Time Delay

(2) Current Limiting

(3) 200,000 amp RMS Interrupt Rating

(4) Voltage Rating: As required for system compatibility

C. MANUFACTURERS:

(1) Square D Company

(2) Cutler – Hammer

(3) General Electric

5. ENCLOSED CIRCUIT BREAKERS:

A. CIRCUIT BREAKER: NEMA AB 1; Voltage and Accessories as indicated on Drawings.

B. ENCLOSURES: Code gauge steel, NEMA 1 or 3R as required.

C. MANUFACTURERS:

(1) Square D Company

(2) Eaton Cutler – Hammer

(3) General Electric

6. CONTACTORS:

A. MECHANICALLY HELD CONTACTORS: NEMA ICS 2; mechanically held, electrically operated.

B. ELECTRICALLY HELD CONTACTORS: NEMA ICS 2; electrically held, electrically operated.

C. COIL OPERATING VOLTAGE: 120 volts, 60 Hz.

D. ENCLOSURES: NEMA ICS 6; Type 1 or 3R as required.

E. MANUFACTURERS

(1) Square D Company

(2) Eaton Cutler – Hammer

(3) General Electric

7. Dry-Type Transformers:

Conform to following requirements for all units. See electrical drawings for transformer ratings and locations.

Transformers shall be dry type constructed and designed, manufactured, and tested in accordance with all applicable ANSI, NEMA & IEEE standards, and shall be listed by Underwriter's Laboratories and bear the UL label.

Transformers shall be designed for continuous operation at rated kVA, 24-hours a day, 365 days a year, with normal life expectancy as defined by ANSI C57.96.

Transformers shall be provided with a universal tap arrangement, 2-1/2% above and 2-1/2% below normal primary voltage. Provide transformers with a minimum of 4 taps.

Transformer's case temperature shall not exceed 35°c above 40°c ambient.

Insulation: transformer shall be insulated with a 220°c insulation system for transformers rated 15 kVA and greater, and shall have 180 degrees c insulation system for transformers rated 15 kVA or less. All transformers a temperature rise not exceeding 115 degrees c under full-rated load in maximum ambient of 40 degrees c. All transformers shall be capable of carrying 115% of nameplate kVA without exceeding insulation rating. Required performance must be obtained without exceeding the above rise in a 40°c maximum, 30°c average ambient temperature.

Sound level: transformer sound levels shall not exceed the ANSI/NEMA levels for self-cooled ratings of:

10-50 kVA	45db
51-150 kVA	50db
151-300 kVA	55db

Core/coil assemblies: transformer coil shall be constructed with a high grade, non-aging, grain-oriented silicon steel with high magnetic permeability, and low hysteresis and eddy current losses. Maximum magnetic flux densities shall be substantially below the saturation point. The core volume shall allow efficient transformer operation at 10% above the highest tap voltage. The core laminations shall be tightly clamped and compressed. Coils shall be wound of electrical grade aluminum with continuous construction.

The core/coil assembly shall be impregnated with a non-hygroscopic, thermo-setting varnish and cured to reduce hotspots and seal out moisture. The assembly shall be installed on vibration absorbing pads.

Sound/vibration isolation pads: provide sound/vibration isolation pads under all floor mounted transformers. Use neoprene-jacketed isolation material bonded to a tapped steel load plate; model n as produced by consolidated kinetics corporation or approved equal. Use size recommended by pad producer for each size of floor-mounted transformer. Sound/vibration isolation pads are in addition to internal sound isolation pads supplied with transformers.

Provide minimum 6" clear space between transformer case and all adjacent walls. Use flexible metal conduit and loop it to allow free motion of transformer.

Sound/vibration isolation pads: install pads in accordance with producer's instructions. Insure there is no direct contact between transformer and building floor or concrete pad.

Equipment pads: provide a 4" concrete pad under all floor mounted transformers.

III. EXECUTION

1. EXAMINATION AND PREPARATION:

A. Make arrangements with utility company to obtain permanent electrical service to the facility. Provide CT Cabinet and Meter base as required by utility for service connection.

2. INSTALLATION:

A. Install utility services in accordance with utility company standards and requirements.

(1) Underground Service: Install service entrance conduits and conductors from the utility service point to the service equipment as shown on the Drawings. The Contractor shall verify and coordinate the location of the power company pad mounted transformer with the local power company and the Engineer of Record prior to bid. The Contractor’s bid shall include all cost associated with the underground service from pad mounted transformer location dictated by local power company.

(2) Provide lugs on utility transformer spaces sized to accommodate service entrance conductors.

B. Install equipment in accordance with manufacturer’s instructions.

C. Except where specifically indicated otherwise, all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, and service neutral of the electrical system shall be grounded.

(1) Equipment grounding shall be accomplished by installing a separate grounding conductor in each raceway of the system. The Conductor shall be provided with a distinctive green insulation or marker and shall be sized in accordance with Article 250 of the National Electrical Code.

(2) The electrical system grounding electrode connection shall be made at the main service equipment and shall be extended to the point of entrance of the metallic cold water service. A suitable ground clamp shall make connection to the water pipe. If flanged pipes are encountered, connection shall be made on the street side of the flange connection. If the metallic water service is coated with an insulating material or there is no metallic water service to the building, ground connection shall be made to additional ground rods as required by resistance tests, at the exterior of the building driven full length into the earth.

(3) The maximum resistance of the driven ground shall be tested with a ground resistance Megger and shall not exceed 25 ohms under normally dry conditions. If this cannot be obtained with a single rod, additional or parallel rods shall be installed 7'-6" on center until 25 ohms or less is achieved without connection to the building water piping. A typewritten test report shall be written.

D. Install panelboards to NEMA PB 1.1.

F. Provide labels for all, panelboards, and distribution equipment.

G. Provide permanent phenolic manufacturer's label for each breaker/switch position in switchboards.

H. Provide typewritten directory in metal circuit directory holder inside panel door for all panelboards.

I. All switchboards and panelboards shall be fully rated. Series rating is prohibited.

END OF SECTION

SECTION: 16500 - LIGHTING

I. GENERAL

1. RELATED DOCUMENTS:

A. Section 16000 – Electrical General Requirements, apply to the work specified in this Section, with additions and modifications specified herein.

2. SECTION INCLUDES:

A. LUMINAIRES

B. SHIELDING MEDIA

C. LAMPS

D. BALLASTS

E. EXIT SIGNS

F. EMERGENCY LIGHTING UNITS

G. PHOTOCELLS

H. TIME SWITCHES

I. LIGHTING CONTACTORS

J. LED BOARDS

K. LED DRIVERS

L. LIGHTING CONTROLS

II. PRODUCTS

1. LUMINAIRES:

A. LUMINAIRE SCHEDULE:

(1) Product requirements for each luminare are specified in luminare schedule on Drawings.

B. ACCESSORIES: Provide required accessories for mounting and operation of each luminare as indicated.

(1) Recessed Luminaires: Provide trim type suitable for ceiling system in which luminare is installed.

(2) Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.

(3) Surface Luminaires: Provide spacers and brackets required for mounting.

C. LAY-IN TROFFERS:

(1) Door Frame: Aluminum .050", extruded with mitered corners. Latches to be fully enclosed, spring loaded, cam type. Door frame shall be fully gasketed.

(2) Housing: Cold rolled steel, 22 gauge minimum with smooth effect mitered corners.

(3) Finish: Painted after fabrication with 90% reflective glossy white thermosetting powder coat.

2. SHIELDING MEDIA:

A. PRISMATIC LENS FOR FLUORESCENT TROFFERS:

(1) Material: Clear virgin acrylic.

(2) Type: Prismatic cones, pattern 12 straight flat prisms.

(3) Thickness: .156" minimum.

B. PRISMATIC LENS FOR FLUORESCENT WRAP AROUND FIXTURES:

(1) Material: Clear virgin acrylic.

(2) Type: Sides-linear prisms, bottom-pyramidal prisms.

(3) Hinging: Either side.

3. LAMPS:

A. DESCRIPTION:

(1) Incandescent Lamps: 130 volts, inside frosted, shape as scheduled. Halogen lamps frosted or clear as scheduled.

(2) Fluorescent Lamps: Size and wattage as scheduled, 4100°K temperature and CRI $\geq$ 75.

(3) High Pressure Sodium HID Lamps: Clear or coated per luminare manufacturer's recommendation. Suitable for ballast furnished in luminare for all burning positions.

(4) Reflector Lamp Beam Patterns: Conform to ANSI C78.379.

4. BALLASTS:

A. FLUORESCENT BALLASTS: Provide electronic fluorescent ballasts suitable for use under installation conditions listed for each luminare.

(1) Ballasts shall meet the requirements of the General Communications Commission Rule and Regulations, Part 18, Class A.

(2) Ballasts shall not contain Polychlorinated Biphenyls (PCB's).

(3) Ballasts shall have a power factor of 95% minimum.

(4) Ballasts shall be UL listed, Class P, and sound rated "A".

(5) Ballasts shall have a frequency of operation of 20 kHz or greater, and operate without visible flicker.

(6) Where applicable, ballasts shall meet minimum efficiency standards of Public Law No. 100-357, National Appliance Energy Conservation Amendments of 1988.

(7) Ballasts case temperature shall not exceed 25°C temperature rise over 40°C ambient. Ballasts cast temperature must not exceed 85°C.

(8) Ballasts shall withstand line transient as defined in ANSI/IEEE C 62.41, Category A.

(9) Input third harmonic current content shall not exceed 10%.

(10) Ballasts shall be manufactured by Advance, Magnetek, or Motorola.

B. COMPACT FLUORESCENT BALLASTS: Provide solid state electronic ballasts suitable for use under installation conditions listed for each luminare.

(1) Ballasts shall be high power factor.

(2) Ballasts shall meet the requirements of the General Communications Commission Rule and Regulations, Part 18, Class A.

(3) Ballasts shall be UL listed, Class P, and sound rated "A".

(4) Ballasts shall have a frequency of operation of 20 kHz or greater, and operate without visible flicker.

(5) Where applicable, ballasts shall meet minimum efficiency standards of Public Law No. 100-357, National Appliance Energy Conservation Amendments of 1988.

(6) Ballasts case temperature shall not exceed 25°C temperature rise over 40°C ambient. Ballasts cast temperature must not exceed 85°C.

(7) Ballasts shall withstand line transient as defined in ANSI/IEEE C 62.41, Category A.

(8) Input third harmonic current content shall not exceed 10%.

C. HID BALLASTS: Provide HID ballast suitable for use under installation conditions and type of each luminare.

(1) Voltage: As scheduled.

(2) Power Factor: High power factor.

(3) Description: ANSI C82.4.

(4) Integral Equipment: Ballast to be mounted internally of the luminare.

5. EXIT SIGNS:

A. DESCRIPTION: Exit sign fixture.

(1) Lamps: Manufacturer's standard.

(2) Voltage: 120/277 volt as scheduled.

B. CONSTRUCTION:

(1) Face: Stencil face with red letters.

(2) Directional Arrows: Universal for field adjustment.

(3) Mounting: Universal for field selection.

(4) Exterior: Shall have a mechanical connection (bolts and screws) between the fixture housing and the canopy base.

C. EMERGENCY POWER SUPPLY: Integral, listed for emergency lighting use.

(1) Battery: Lead calcium or nickel cadmium type.

(2) Battery Charger: Dual-rate type.

(3) Indicators and Controls: AC ON; test switch.

D. WARRANTY: 5-year full fixture.

6. INCANDESCENT EMERGENCY LIGHTING UNITS:

A. Not used. See LED EMERGENCY LIGHTING UNITS this section.

7. PHOTOCELL SWITCH:

A. MANUFACTURERS:

(1) Precision

(2) Tork

(3) Paragon

B. DESCRIPTION: Photocell switch manufactured to NEMA ICS 2.

C. RATINGS:

(1) Contact Ratings: 1800 VA at 120/277 volts.

(2) Sensitivity: Field adjustable from 3 to 10 foot-candles.

D. ENCLOSURE: Gasketed, cast aluminum or feralloy box with conduit hub.

8. TIME SWITCH:

A. MANUFACTURERS:

(1) Precision

(2) Tork

(3) Paragon

B. DESCRIPTION: Clock timer manufactured to NEMA ICS 2, with astronomical dial, 12-hour spring wound carry over, and day skipping feature.

C. RATINGS:

(1) Contact Ratings: 20 ampere per pole, number of poles as indicated on Drawings.

(2) Coil Voltage: 120 volts, 60 Hz.

(3) Dial Timer: Seven (7) day.

(4) Enclosure: NEMA 1 or 3R as required.

9. CONTACTORS:

A. MANUFACTUERS:

(1) Square "D" Company

(2) Cutler-Hammer

(3) General Electric Company

B. LIGHTING CONTACTORS: NEMA ICS 2; mechanical held, electrically operated.

(1) Coil Operating Voltage: 120 volts, 60 Hz.

(2) Enclosures: NEMA ICS 6; Type 1, general purpose.

(3) Multi-pole, 20 amp rating, number of poles as indicated on the Drawings.

10. LED LIGHTING FIXTURES:

A. DESCRIPTION: Self-contained emergency lighting unit.

(1) Input Voltage: 120/277 volts as scheduled.

(2) LED Lamp Life: Minimum 100,000 hours

(3) Battery Charger: Dual-rate type.

(4) Lamps: Sealed beam PAR, DC type or halogen.

B. SPARES: For each type of LED lighting fixture provide additional complete spare lighting fixtures equal to 5% of total quantity installed and 10% spare components (LED boards and drivers) of total quantity installed.

C. ELECTRICAL CONNECTION: Conduit connection.

D. WARRANTY: Minimum 5-year full fixture.

11. LIGHTING CONTROLS:

A. DESCRIPTION: Provide a complete and fully operational lighting controls system.

(1) Approved Manufacturers for Stand-Alone Systems: Acuity Brand nLight controls or approved equal. Manufacturers for consideration as equal shall be submitted to

the Engineer of Record 10 days prior to bid date and are not approved as equals without written approval from the Engineer of Record.

(2) Approved Manufacturers for Networked Central Systems: Acuity Brand nLight controls or approved equal. Manufacturers for consideration as equal shall be submitted to the Engineer of Record 10 days prior to bid date and are not approved as equals without written approval from the Engineer of Record.

B. SPARES: For each type of lighting controls device for both stand-alone and networked systems, provide additional complete spare devices equal to 10% of total quantity installed for each device but at least a minimum of two devices (except for main gateway "head-end"). This includes but is not limited to occupancy sensors, vacancy sensors, power packs, touch screens, each type of switch, bridges, and gateways.

C. START-UP, COMMISSIONING, and TRAINING: The Contractor shall provide on-site start-up and training by a certified technician/representative of the controls manufacturer. The technician shall schedule to be on-site for a the number of days required to program and start-up the system plus two additional days dedicated to training personnel and programming the system to operate in "test-mode" for the independent commissioning agent to perform necessary commissioning.

D. WARRANTY: Minimum 5-year full fixture.

III. EXECUTION

1. EXAMINATION AND PREPARATION: Examine adjacent surfaces to determine that surfaces are ready to receive work.

2. INSTALLATION:

A. Install luminaires and accessories in accordance with manufacturer's instructions.

(1) Provide pendant accessory to mount suspended luminaires at height indicated. Use swivel hangers on sloped ceilings.

(2) Support surface mounted luminaires from ceiling structure; provide auxiliary support across ceiling structure support. Fasten to prohibit movement.

(3) Install recessed luminaires to permit removal from below. Install luminaires so that there is no light leakage around fixture trim. Support fixtures in accordance with Article 410-16 C of the National Electrical Code.

(4) Install lamps in luminaires and lampholders.

3. ADJUSTING AND CLEANING:

A. Align luminaires and clean lenses and diffusers at completion of work.

B. Aim adjustable luminaires and lampholders as indicated or as directed.

C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.

D. Clean paint splatters, dirt and debris from installed luminaires.

E. Relamp luminaires which have failed lamps at completion of work.

F. Touch up luminaire and pole finish at completion of work.

G. Adjust relays, timers, photo controls, etc. to achieve specified or directed operation.

END OF SECTION

SECTION 16650

AUDIO – VISUAL SYSTEMS

PART 1 GENERAL

1. RELATED SECTIONS

(A) The Drawings, General, Special and Supplementary Conditions of the Contract to the Work of this Section.

(B) All project construction documents correspond to this Section.

(C) The Specification Sections of other disciplines correspond to this Section, insofar as contractor coordination and the requirements for interconnection with the work of other contractors are required, and insofar as they apply.

(D) Division 16000 – Electrical Systems

2. SYSTEM DESCRIPTION

(A) Audio Reinforcement Systems consist of loudspeakers, digital audio processing platform, audio power amplification, equipment cabinet, cabling, rigging materials, and wiring.

(B) Video Reinforcement & distribution systems consist digital video processing, HDBaseT transmitters, switchers and receivers, processors, switcher/scaler, touch panels, controllers, cabling and connectors.

(C) Integration of any owner furnished equipment (OFE), furnishing and installation of specified products, as well as incidental equipment, hardware and cabling required providing complete and fully functional systems. Furnish, deliver, erect, and connect all the material and equipment described herein and in the drawings, and also all other incidental material and tools, transportation, etc. required to make work complete, in accordance with these plans and specifications, as required to leave the system in first class operating condition, excluding those items designated WORK BY OTHERS (WBO) or NOT IN CONTRACT (NIC).

(D) Verify dimensions and conditions at the job site prior to installation, and perform installation in accordance with these specifications, manufacturers' recommendations and all applicable code requirements.

(E) The AV systems include the following major items:

a) Digital audio mixing, processing and routing components
b) Loudspeakers and loudspeaker mounting or support hardware
c) Video displays, video processors, support cabling & hardware
d) Equipment Racks, Cabinetry, and Furniture
e) Cables, Connectors, Plates, and Wiring
f) Preparation of submittal information
g) Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements
h) Specific control system programming, training & support
i) Initial tests and adjustments, demonstration for approval, final adjustments and documentation
j) Instruction of operating personnel; provision of manuals
k) Maintenance services; warranty

(F) Provision of system testing, system documentation and instruction of Owner Personnel.

(G) Guarantees and Warranties.

3. REFERENCES

In addition to the references in Division 1, all requirements of the latest published edition, unless otherwise noted, including but not limited to the following, shall apply. In the event of conflict between cited or referenced standards, the more stringent shall govern.

a) National Electric Code (N.E.C).

b) Federal Communications Commission (F.C.C.) Rules and Regulations, Part 76.

c) Society of Cable Television Engineers (S.C.T.E.)

d) Society of Motion Picture and Television Engineers (S M P.T.E.)

e) American Society for Testing Materials (A.S.T.M.)

f) National Cable Television Association (N.C. T. A.)

g) Electronic Industries Association (E.I.A)

h) Telecommunications Industries Association (T. I.A.)

i) “Handbook for Riggers”, 1977 Revised Edition, Newberry, W. G., Calgary, Alberta Canada.

j) “Basic Principles for Suspended Loudspeaker Systems”, Technical Notes Volume 1, Number 14, JBL Professional.

k) Davis, Don and Carolyn, Audio system Engineering, Second Edition, Howard W. Sams and Co., Indianapolis, Indiana, 1986.

l) DOE Standard DOE-STD-1090-99 Hoisting and Rigging

4. SUBMITTALS

(A) Provide shop drawings and record drawings using the following scales:

a) Details – not less than 1/4”=1’-0”

b) Plans – not less than 1/8”=1’-0”

(B) Mark all submittal documents to show the project name, date, Architect, Contractor, Sub-Contractor, and this specification Section number.

(C) Make each specified submittal as a coordinated package complete with all information. Uncoordinated sets will be returned without review.

(D) Cable and Connector Submittal: Submit sample cable with connections and wire labels. Cable sample should be 18” in length. Submit cable/connector assemblies for each type of cable to be used on the project. Manufacturer’s cable jacket ID lettering must be included on the sample cable.

(E) Product Data: Submit manufacturer’s product data sheets for each item of equipment that will be provided as part of this contract. Provide a complete list of proposed equipment broken down by system. Provide a budget summary page listing price by system. Binders shall be 3-ring binders sized to handle materials plus 34% excess. All cut sheets shall be arranged by system type and then by specification number with tabbed dividers between sections. A table of contents shall appear at the front of the binder.

(F) Submit heat load calculations showing how loads were derived if requested by Owner or

Owners Representative.

(G) Custom Software Programming including Graphical User Interface (as required). Provide for approval at least three (3) weeks prior to system commissioning, electronic copies of all custom software. It is the Contractor's responsibility for all custom software programming for the systems they are controlling. Coordination with the Consultant is required for the development of this software.

(H) Provide Panel Fabrication Details including panel engraving schedule to Owner and Consultant prior to ordering panels.

(I) Any technical questions shall be submitted by email to the AV Consultant, unless otherwise noted by the Owner, Architect or Purchasing Agent.

Walthall & Associates, Inc.
200 Swift Creek Drive; Suite G
Cantonment, FL 32533
Electronic mail: chuck@walthall.us
Telephone (850) 478-9002

5. QUALIFICATIONS

(A) Bidder shall be an A/V systems contractor, normally engaged in the full time business of A/V systems installation. Show proof that bidder has been in the communications system installation business for a period of no less than five years and has completed projects of similar size and scope. The Owner and/or Owner's representative reserves the right to reject any bids submitted by firms without sufficient experience in projects of this size, complexity, or any other terms the owner or owner's representative may deem relevant.

(B) No sub-contractor or contract employees will be permitted to perform the contractor's responsibilities as defined herein, unless specifically identified in the bid submission and approved by the Owner and/or Owner's representative. The contractor shall have sole responsibility for the satisfactory execution of the work, even though he may have sub-contracted a portion of the work, or had certain manufacturers install their own products.

(C) The Contractor shall provide resumes of the project coordinator (manager) and lead installer planned to be used for this project. This shall be presented at the presentation of proposal. The Contractor shall maintain the same project manager and lead installer throughout the course entire course of the project. If a personnel change is required the Contractor shall notify the Owner and/or Owner's representative and the General Contractor 30 calendar days prior to the change.

6. QUALITY ASSURANCE

(A) Review architectural, civil, structural, mechanical, electrical, and other project documents relative to this work.

(B) Verify all dimensions on the site.

(C) Coordinate the specified work with all other trades.

(D) Provide all items not indicated on the drawings or mentioned in the specifications that are necessary, required or appropriate for this work to realize complete, stable and safe operation.

(E) Review project documentation and continuously make known any conflicts discovered and provide all items necessary to complete this work to the satisfaction of the Owner and/or Owner's representative without additional expense. In all cases where a device or item or

equipment is referred to in singular number or without quantity, each such reference shall apply to as many such devices or items as are required to complete the work.

(F) Provide additional support or positioning members as required for the proper installation and operation of equipment, materials and devices provided as part of this work as approved by the Owner and/or Owner's representative, without additional expense.

(G)Regularly examine all construction, and the work of others, which may affect the work to ensure proper conditions for the equipment and devices before their manufacture, fabrication or installation. Contractor shall be responsible for the proper fitting of the systems, equipment, materials, and devices provided as part of this work.

(H) Promptly notify the Owner and/or Owner's representative of any difficulties that may prevent proper coordination or timely completion of this work. Failure to do so shall constitute acceptance of construction as suitable in all ways to receive this work, except for defects that may develop in the work of others after its execution.

(I) The Systems Contractor shall maintain the same Project Coordinator (Manager) and Field Supervisor throughout the entire project. The Systems Contractor shall provide contact information to the client, AV Consultant, General Contractor and Electrical Contractor, for both parties prior to commencing on-site project work.

(J) Source Limitations: Obtain as many products as possible from a single manufacturer. Obtain each item as a completely newly manufactured unit, including necessary mounting hardware, manuals and accessories.

7. OWNER'S RIGHT TO USE EQUIPMENT

(A) The Owner reserves the right to use equipment, material and services provided as part of this work prior to final acceptance without incurring any obligation to:

a) Accept material and equipment or completed systems until all punch list work is completed and all systems are acceptable.

b) Pay additional cost or charge.

c) Commence the warranty period for any system or device provided as part of the work.

8. PERMITS AND INSPECTIONS

(A) Obtain all required permits and inspections.

(B) Furnish material and workmanship for this work in conformance with all code requirements

(C) Perform all tests required herein, or as may be reasonably required to demonstrate conformance with the specifications.

9. DELIVERY, STORAGE, AND HANDLING

(A) Store equipment and materials safely and securely inside at the job site in a manner that will not interfere with the work of other trades.

(B) Replace all damaged or defective work or material at no additional cost, prior to acceptance.

(C) Check, and if necessary, clean all systems, equipment, devices and components included in the work after acceptance and completion of the work of all other trades.

(D) Store materials in designated areas.

(E) Provide and maintain suitable barriers, guards, fences and signs wherever necessary for the safety of others relative to and/ or for the protection of this work.

(F) Protect all materials and equipment to prevent the entry or adhesion of concrete, plaster, unintended paint, or other damaging debris or materials.

10. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

(A) Submit shop drawings, product data and samples together in one package within thirty (30) days after award of the Contract and prior to ordering equipment.

(B) Submit catalog data sheets, neatly bound with title page, space for submittal stamps, and tabbed dividers between Sections. Provide a complete list of proposed equipment. Provide a summary of pricing broken down by system. Denote all substitutions.

(C) Submit rack layouts indicating the proposed arrangement of mounted equipment including junction boxes and locations of conduit penetrations.

(D) Submit construction details of all custom fabricated items and approved equipment modifications. Include complete parts lists, schematic diagrams, and all dimensions required for proper assembly.

(E) Submit finish schedule indicating proposed color selections and finishes for custom fabricated items, wall plates and custom labels.

(F) Submit mounting and support details for all items mounted overhead, including loudspeakers complete with parts lists and dimensions. Include a full plan view, front elevation and side elevation of each unique item with corresponding support structure and mounting hardware.

(G) Approval of shop drawings or submittal indicates only the acceptance of the manufacturer and quality. Specific requirements, arrangements, and quantities still must comply with the intent of the contract documents as interpreted by the Owner and/or Owner's representative unless specifically approved in writing.

(H) Submittals, which are incomplete, deviate significantly from the requirements of the Contract Documents, or contain numerous errors, will be returned without review for rework.

11. PROJECT RECORD DRAWINGS (As Built Drawings)

(A) Approved shop drawings, updated to accurately document the final conditions of the system installation. Legibly mark to record actual construction:

a) Field changes of dimension and detail.

b) Changes made by Revision Order, Directive or other modifications.

c) Details not in original contract drawings.

d) Any other miscellaneous items installed under this contract. At a minimum, the ends of each line should have the type of termination, coordinate and elevation indicated.

e) Layouts of system devices showing actual device locations.

f) Results of all Field Quality Control Tests in this Section.

12. OPERATION MANUALS

(A) Operation manuals shall include, but not limited to the following sections:

a) Table of Contents.

b) Typed description of system including key features and operational concepts (e.g. remote control features, switching functions, and mixing capabilities).

c) Setup diagrams and typed instructions for use in typical situations as directed by the Owner.

d) Small scale plans showing locations and circuit numbers for all system outlets and receptacles.

e) Single-line block diagrams showing all major components of the systems.

f) Manufacturer's operation manuals for user-operated equipment (tape decks, processors, communication equipment, etc.).

13. MAINTENANCE MANUALS

(A) Provide the owner any maintenance manuals that come packaged with equipment.

14. PROJECT CONDITIONS

(A) If project conditions indicate a need to vary from the Specifications or Drawings, notify the Owner and/or Owner's representative, make recommendations, and proceed with the necessary changes only after receipt of approval from the Owner and/or Owner's representative.

(B) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

15. WARRANTY

(A) Provide a one (1) year System Warranty, and the following, at no additional cost to the Owner.

(B) Warranty shall contain the following:

a) Date, project title and number.

b) Contractor's name, address, telephone number and point of contact.

c) Title and number of each as-built document.

d) Signature of contractor, or its authorized representative.

e) Include the name of a contact person for service or maintenance and define the limits of the system warranty.

(C) During the System Warranty period, answer all service calls and requests for information within twenty-four (24) hours. Repair or replace faulty items and correct faulty workmanship on site within twenty-four (24) hours of all service calls.

(D) Conduct all warranty repairs and service at the job site unless in violation of manufacturer's warranty. In the latter event, provide substitute systems, equipment, and/or devices, acceptance to the Owner, for the duration of such off site repairs. Transport warranty materials, parts, and personnel to and from the job site at no additional cost.

(E) For products with manufacturer's warranties lasting more than one (1) year, register warranties in the Owner's name.

16. SUBSTITUTIONS

(A) Denote any substitutions for consideration by the Owner or Owner's representative.

18. BRAND NAMES AND ACCEPTABLE ALTERNATIVES

(B) The brand name(s) and model number(s) mentioned are used in this specification as a measure of quality and performance. Any brand or manufacture of acceptable or better quality and performance than that specified will be considered for acceptance by the Owner and/or Owner's representative at time of Bid. However, the Owner and/or Owner's representative reserves the right to reject and deny any substitution that it may, in it's sole discretion, deem unequal, and the findings in this regard shall be accepted by the bidder as final and binding.

19. OWNER FURNISHED EQUIPMENT (O.F.E.)

(A) Certain equipment may be identified as Owner Furnished (OFE or Existing). This Owner Furnished Equipment may presently be part of the Owner's system, or will be provided by the Owner, and will be delivered to the contractor's off-site construction facility, delivered to the contractor's on-site secured storage area, or installed on site by others, as appropriate, for incorporation into the system.

(B) Clean and inspect the OFE, and notify the Owner and/or Owner's representative of damage or defect and the extent of repair and/or adjustment required to bring the OFE to original specification. Service OFE only if directed by the Owner and/or Owner's representative under the arrangements of a separate contract.

(C) Connect, terminate and properly incorporate OFE into the proper system for its type. Reconnect any equipment disconnected for installation of new equipment. Verify proper operation and control functions as before removal.

20. INSURANCE

(A) Insure materials against theft, vandalism, damage due to the elements, fire, etc., to their full value. Materials and the flawless condition of materials shall remain the responsibility of the contractor until acceptance of the system by the Owner.

(B) Contractor shall be responsible for having in force the following insurance protection, this protection shall also be required for any subcontractors the Contractor may hire. Certificates of insurance shall be provided within five (5) calendar days upon request.

a) Workers Compensation Coverage for all workers

b) General, Automobile and Excess or Umbrella Liability Coverage

c) General Liability Coverage – Occurrence Form Required

d) Business Automobile Liability Coverage

21. WORK BY OTHERS (WBO, BY OTHERS) NOT IN CONTRACT (NIC)

(A) As noted on drawings and in project documentation

22. BEST VALUE ITEMIZED PROPOSAL

(A) As noted elsewhere, the AV contractor shall furnish items meeting or exceeding the specifications, items which are new and of the latest technology.

(B) Each item or system group of items shall be individually priced with the understanding ESCAMBIA SCHOOL DISTRICT may select any single or any combination of items as required meeting any budget constraints. Where the contractor chooses, an alternate item or system may be proposed in addition to the items specified.

(C) Award will be based on best value to ESCAMBIA SCHOOL DISTRICT, so proposers are required to attach literature as required, on each individual component proposed and may in-

clude with each a narrative explaining the merits of the component.

(D) In addition to above, the AV contractor shall include a narrative at the beginning of his proposal describing the Project Approach, personal experience and overall relative value to ESCAMBIA SCHOOL DISTRICT. This narrative should not exceed two double-spaced typewritten pages and may include any other points the proposer wishes to include.

PART 2 PRODUCTS

1. GENERAL

(A) All equipment, except OFE, and materials shall be new, latest version at time of bid, and shall conform to applicable UL, CSA, or ANSI provisions. Re-manufactured or "B" stock equipment will not be accepted without prior written consent from the Owner and/or Owner's representative. Evidence of unauthorized re-manufactured, or "B" stock equipment on the project site will be deemed evidence of the contractor's Failure to Perform the Work. Take care during installation to prevent scratches, dents, chips or disfiguration.

(B) Regardless of the length or completeness of the descriptive paragraph herein, each device shall meet all of its published manufacturer's specifications. Verify performance as required.

(C) Asbestos Prohibition: No Asbestos containing materials shall be used under this section. The contractor shall insure that all materials incorporated in the project are Asbestos free unless specifically authorized in writing by the Owner and/or Owner's representative.

(D) All products listed below are listed for sole source information and establishment of the level of quality required by this project. Refer to the project drawings to establish quantities.

(E) Install all rack mounted equipment with black steel 10-32, button head machine screws with plastic cup washers protecting equipment panel. Do not over torque, round out, strip or mar screws.

(F) Provide and install an escutcheon ring around all pipes, poles and mounts that penetrate the ceiling. Color to be determined by owner.

(G) Some rack-mounted equipment may require shaft locks, covers, or removal of knobs; provide and install during Acceptance Testing

(H) Provide plastic permanent approved labels at the front and rear of all rack-mounted power amplification and signal processing equipment. Mount labels on the equipment rack or equipment chassis, and attach in a neat, plumb, and permanent manner. Embossed labels will not be accepted. Label equipment with schematic enumeration reference, and with descriptive information regarding its function or area it is serving. Similarly, provide permanent approved labels at the rear only of equipment mounted in furniture consoles.

(I) All engraving shall be 1/8" block lettering unless noted otherwise. On dark panels or pushbuttons, letters shall be white. Letters shall be black on stainless steel, brushed natural aluminum plates or light-colored push buttons.

(J) All accessories provided by equipment manufacturer shall retain the property of the owner. Collect, inventory and present to owner after Acceptance Testing.

(K) Per IEC-268 standard, all XLR connectors not mounted on equipment shall be wired pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).

2. AUDIO SYSTEMS MATERIALS

(A) The materials or description of work in this section is typical for all systems in this section and all following specification sections.

(B) All equipment items required to provide a fully functional system may not be noted or depict-

ed on the schematic diagrams. Confirm your quote includes all required equipment documented in the system drawings and any required equipment not listed or shown. Report any missing or required equipment to the Consultant prior to submitting your quote.

(C) Mounting Hardware exposed to the weather shall be aluminum, brass, and epoxy painted galvanized steel, or stainless steel. Apply corrosion inhibitor to all threaded fittings. AV Contractor can sub the control system programming, training and support from a certified programmer/company.

(D) AUDIO-VISUAL & STAGE LIGHTING EQUIPMENT

Reference AV drawings for make, model and quantity of AV components. Notify AV Consultant of any discrepancies prior to submitting bids or shop drawings. Failure to notify does not constitute change order (add) approval.

Verify with system drawings, on-site inspection and requirements to provide a fully functional system(s).

Provide all materials, labor, training and miscellaneous equipment required.

Provide all display mounting devices; wall, ceiling, truss, etc. as required.

Provide all mounting clamps and safety cables for suspended lighting fixtures, battens and rigging.

Provide proper lensing (T/W) as noted on the schematic and plan drawings to properly fill the screen with no less than 10% +/- tolerance.

Provide all industry standard patch bays, fiber trays, patch cords and fiber link cables as required.

Provide all required network, audio, video, POE, POE+ DMX and control cables as required.

Provide all digital system programming and GUI control design.

3. CABLES AND CONTROL WIRING

(A) All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper and shall be Anaconda, Triangle, General or approved equal for power, and Alpha, Belden, or West Penn for low voltage. Cables in plenum rated ceilings outside conduit shall be similar to those listed above, except plenum rated.

(B) Homerun ALL Loudspeaker Cables, Reinforcement Loudspeaker Cables, Monitor and Foldback Loudspeaker Cables. Cables between loudspeakers interconnect junction boxes and racks to be at least No. 12 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(C) Other Loudspeaker Cables to be at least No. 16 AWG jacketed pair equal to West Penn CL3 rated product or as shown on the AV drawings.

(D) Line Level and Microphone Level Cables to be at least No. 22 AWG shielded jacketed pair eq

(E) ual to West Penn CL3-452 or CL3-291 or as shown on the AV drawings.Multi-conductor High Resolution Video Cable shall be manufactured by Extron Electronics or West Penn CDT.

(F) Coaxial Cable for video and RF transport shall be RG-6 quad-shielded with a solid copper center conductor. Any other cable if installed shall be removed and replaced with approved cable at no additional expense to the owner.

(G) Low Voltage Control Cabling to be at least No.18AWG shielded CL3 rated cable, conductor count to be determined by application.

(H) All cables that are not in conduit and are run through plenum rated spaces shall be plenum rated cable of the gauge and conductor count required for the application.

4. ADD OPTIONS

(A) Provide pricing on the following add option for purchasing consideration by the Owner. Ensure pricing includes all necessary components, parts and labor to provide a fully functional system.

5. DELETE OPTIONS

(A) Provide pricing on the following delete options for purchasing consideration by the Owner. Ensure pricing includes all necessary components, parts and labor to provide a fully functional system.

a) DELETE OPTIONS are at Owner's discretion upon receipt of proposal.

6. FABRICATION

(A) Equipment Racks

a) Pre-assemble and test all racks before delivery to the job site, provide a written report on pre-assembly and test results to Owner/Owner's Representative.

b) Verify the depth of each rack prior to assembly to ensure that mounted equipment will fit completely inside with the front and rear door closed.

7. SOURCE QUALITY CONTROL TESTS

(A) Use the following test equipment meeting the following minimum specifications to perform the Source Quality Control Tests and Field Quality Control Tests. Furnish the same test equipment for the performance of Acceptance Testing.

a) Digital Multimeter

DC to 20 kHz bandwidth
300 V range, 100 mV resolution
10 megohms input impedance
Direct reading of dBm across 600-ohm load
DC resistance to .1 ohm
Dual Trace Oscilloscope *(if required or requested)*
100 MHz bandwidth
1 mV/CM sensitivity
Dual time base capability

b) Sine/Square Wave Generator

5 Hz to 5 kHz bandwidth
Output level of 0 dBm with less than .5% THD

c) Impedance Bridge

Range: 1 ohm to 1 megohm

Three test frequencies, minimum, ranging from 250 Hz to 4 kHz

d) Sound Level Meter

ANSI Type 2 with one-octave filter set

(B) Measurements

a) Measure and record impedances curves for each loudspeaker line entering rack at 1000 Hz.

b) Grounding System tests as described in the Technical Systems Specification.

8. MISCELLANEOUS CONNECTORS

(A) Certain connectors not identified in specific paragraphs, or indicated on the drawings, are specified by generic “type”. At all times, match connector types used in adjacent project areas, including existing audio, television and audiovisual systems.

a) D(*)F - Switchcraft D(*)F or Neutrik NC(*)F
b) D(*)M - Switchcraft D(*)M or Neutrik NC(*)MP
c) TRS-F - Switchcraft 121
d) TRS-M - Switchcraft 280 or Neutrik NP3C-BAG
e) TRS-FJ - Switchcraft 14B or Neutrik NJ3FP6C-BAG
f) S4FC - Neutrik NL4FC
g) S4MP - Neutrik NL4MP
h) BNC - Canare BCJ-R
i) BNCL - Canare BCP-S4
j) BNC-R - Canare BCJ-RU

PART 3 EXECUTION

1. INSTALLATION

(A) Verify existing conditions before starting work.

(B) Execute all work in accordance with Part 1.3 References in this guideline, and with all local and state codes, ordinances, and regulations.

(C) Install equipment according to manufacturer’s recommendations.

(D) Install all rack-mounted equipment with black steel 10-32, button head machine screws, using plastic cup washers to protect equipment panel.

(E) Rack mounted equipment shall be mounted into racks and fully wired and tested, before delivery to job site. *(Does not apply when racks are existing)*

(F) Install flat black blank panels in all unused rack positions. Use no larger then a two space panel.

(G) Ensure that levels and impedances are properly matched between components.

(H) Choose colors and finishes of all exposed and custom fabricated items and labels to blend in with the surroundings as approved by the Owner and/or Owner’s representative.

(I) Firmly and permanently attach electrical boxes, enclosures and permanent equipment to the building. Rigidly mounted equipment and devices shall be level, plumb and square.

a) Set “flush-mounted” units so that the face of the cover, bezel, or escutcheon is in the same plane as the surrounding finished surface.

b) Mount boxes, panels and trim so that there are no gaps, cracks, or obvious lines between the trim and the adjacent finished surface, and ready them to receive final finish, as applicable.

c) Provide access panels where needed to access boxes, panels and enclosures in walls or ceilings, as indicated and dimensioned on the shop drawings.

d) Finish panels to match the surrounding surfaces.

(J) Supports and mounts for equipment to be installed over public areas shall be permanently attached to suitable building structure adequate to support the equipment loads with a safety factor of at least five.

(K) Use attachment hardware with a minimum SAE Grade 5 load rating. Do not use formed eye-bolts or lag screws for support or connection of suspended equipment.

(L) Verify capacity of mounting methods used in the work and associated liabilities. All attachments, attachment points, reinforcement requirements, and hardware selection shall be executed in accordance with the references in PART 1.

2. GROUNDING, SHIELDING AND ISOLATING

(A) Mount and enclose all electrical and electronic equipment in metal enclosures, pedestals or equipment racks.

(B) All junction boxes shall be bonded to the building safety ground.

(C) Use EMT type conduit for all wiring outside of equipment racks except plenum rated wiring above a lay-in ceiling, and outdoor conduits and raceways, where separate insulated ground wiring shall be supplied.

(D) Use flexible conduits and PVC fittings to provide insulated connections of the building electrical raceways to equipment racks. Mount all equipment racks at the job site in a manner that provides electrical isolation from the building structure and electrical raceways.

(E) Electronics racks and cabinets shall be boned to the isolated ground technical power system only. Refer to Section 16770 for coordination and test with the Electrical Contractor.

(F) In the case where a metal equipment cabinet or rack is located on a suspended, concrete or bonded flooring system, the enclosure shall be placed on a Santoprene isolating mat with a minimum thickness of 3/32” and a Durometer of 80A,.

3. WIRING PRACTICES

(A) Where specific instructions are not given, perform all wiring in strict adherence to standard broadcast and sound engineering practices in accordance with the references listed in PART 1.

(B) Group all wiring into the following classifications by power level or signal type:

a) Microphone Level: less than -20 dBm.

b) Line Level Audio and DC Control Circuits: -20 dBm to +30 dBm.

c) Speaker Level: greater than +30 dBm.

d) AC Mains Power Circuits

(C) Separate wiring of differing classifications by at least six (6) inches, wherever possible. Wherever lines of differing classification must come closer together than six (6) inches, cross them perpendicular to each other.

(D) Neatly harness wires together within racks by power level classification using horizontal and

vertical wiring supports as required. Rigidly support all wires within 6” of fixed connection points. Leave service loops of sufficient lengths to allow rack hinges or slides to fully extend to facilitate access to rear panel connectors from the front of each rack. Do not use self-adhesive anchor pads for support of cables.

(E) Observe consistent polarity throughout the audio systems as follows:

a) Use only balanced differential inputs throughout all audio systems unless otherwise noted.

b) Use approved transformers where directed to reduce objectionable system noise to acceptable levels.

(F) Exercise care in wiring to avoid damaging the cables and equipment. Use grommets around cutouts and knockouts where conduit or chase nipples are not installed. Use bushings where conduit terminal connections are exposed in or out of junction boxes.

(G) Cut off unused wire ends approximately one-half inch (1/2“) past the wire jacket. Fold them back over the jacket, and secure in place with heat-shrink tubing. In multi-conductor cables, preserve all unused conductors for future use. Failure to do so may result in replacement of cables at the contractor’s expense.

(H) Provide a minimum 6” service loop or enough cable to allow for three (3) subsequent terminations which ever is greater.

(I) All cable jacket exposed stripped ends shall be dressed with the appropriate sized heat shrink.

(J) All drain cables shall be protected from the jacket strip to the point of termination. Exposed bare wire is not acceptable.

(K) Make all connections using rosin-core solder in conjunction with approved mechanical connectors unless other is specified by manufacturer. Connect microphone, control, and line level wiring through approved connectors. Connect speaker level wiring using approved terminal barrier strips. Mount all terminal devices on a non-conductive (electrically) rigid surface. Provide 10% spare terminals at each location. Label each terminal with a unique number.

(L) Make all power amplifier output connections directly into amplifier binding posts, friction fit connectors are not acceptable. In the event the amplifier doesn’t have binding posts, and has barrier strip connections, crimp and solder the appropriate fork lug to the cable and torque screws to manufacturer’s specification.

(M) All fiber optic cable splicing shall utilize the fusion splice method. The maximum allowable loss per fusion splice shall be 0.5 dB.

4. LABELING

(A) Label products in a logical, legible, and permanent manner corresponding to the Drawings. Wording, format, style, color, and arrangement of text will be subject to the Owner and/or Owner’s representative’s approval. Submit samples and labeling schedule for approval. Labeling will be verified at final adjustment and equalization

(B) Label all wall plates for input, output, and control receptacles as well as connector mounting plates in all boxes using 1/8” engraved lettering filled with black or contrasting paint, as approved.

(C) Use engraved plastic labels similar to Lamicoid, squarely and permanently attached, to label the following:

a) Patch panel designation strips.

b) Front and back of all rack mounted equipment including controls

c) Barrier strips, terminals, transformers, switches, relays, volume controls, and similar devices.

(D) Label pushbutton switches with engraved lettering filled with contrasting color paint.

(E) Label all permanently installed wires on both ends with approved permanent clip-on type or sleeve type markers. Wrap-around adhesive labels will not be accepted unless completely covered with clear heat shrink tubing.

(F) Label all portable equipment with engraved block letters using initials and/or words. Label all portable cables similarly with printed heat-shrinkable tags located 12 inches from the male connector end. Verify lettering through the Owner and/or Owner's representative prior to engraving or printing.

(G) Label access panels and backboards with designations corresponding to the drawings. Where devices are concealed above access ceilings, provide permanent lamicoid labels, on the ceiling supports corresponding to the drawings in finishes and sizes approved by the Owner and/or Owner's representative.

5. FIELD QUALITY CONTROL TESTS

(A) Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner and/or Owner's representative during the entire installation.

(B) Before connecting any equipment to AC power outlets, measure the AC voltages between hot, neutral, and ground and verify correct voltage and polarity of AC power. Equipment damaged by connecting to improperly wired outlets shall be replaced at no addition cost to the Owner.

(C) Upon completion of the system installation, it shall be the responsibility of the contractor to perform the necessary adjustments and balancing of all signals and amplifier gain, and other level controls to ensure proper system operation. The Owner shall physically inspect the system and/or Owner's representative to assure that all equipment is installed in a neat and workmanlike manner as called for by the plans and specifications.

(D) Determine the proper sequence of energizing systems to minimize the risk of damage.

(E) After successfully energizing the systems, make all preliminary adjustments and document the setting of all controls, parameters of all corrective networks, voltages at key system interconnection points, gains and losses, as applicable.

(F) Verify the performance parameters of the individual systems following established professional procedures, in addition to those specified herein.

(G) Measure and record impedance curves of all loudspeaker lines at amplifier rack terminal barrier strips prior to connecting to amplifier outputs.

(H) Apply a sine-wave sweep signal to each loudspeaker system, sweeping from 50 Hz to 5000 Hz at a sound pressure level which is 10 dB below the loudspeaker's rated electrical input power. Listen for rattles or objectionable noise and correct if apparent.

(I) Using a +4 dBm sine-wave input, set controls of each component to produce a +4 dBm sine-wave output. Under these conditions (unity gain), the presence of any waveform, distortion, interference signals, or oscillations shall be unacceptable.

(J) Check for proper polarity of ceiling mounted loudspeakers by applying music program or pink noise to each system and walking through the transition areas of coverage from one loudspeaker to the next. Transition should be smooth with no apparent shifting of source from one loudspeaker to the next.

(K) Drive each ceiling distributed loudspeaker system with one octave of pink noise centered at 1000 Hz at a sound pressure level which is at least 10 dB above the ambient noise. Adjust power amplifiers to provide uniform distribution of sound throughout the seating areas within a tolerance of ±3 dB. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(L) Individually drive each reinforcement loudspeaker with one octave of pink noise centered at 1000 Hz at a sound pressure level, which is at least 10 dB above the ambient noise. Adjust

power amplifiers to provide an equal sound pressure level from each loudspeaker on its aiming axis in the seating area. Use an ANSI Type 2 sound level meter set for slow meter damping to take readings at seated ear height.

(M) Upon completion of initial tests and adjustments, notify the Owner and/or Owner's representative the system is ready for final equalization and acceptance testing.

6. TEST EQUIPMENT

(A) Provide the following test equipment on site during construction and available to the Owner and/or Owner's representative during final adjustment and acceptance testing:

a) Digital Multi-meter

b) 100 MHz Dual Trace Storage Oscilloscope

c) Video Test Pattern Generator *(XGA, Component, YC and Composite)*

d) Sine/Square Wave Generator

e) Impedance Bridge

f) Sound Level Meter - ANSI Type 2 with one-octave filter set

7. FINAL ADJUSTMENT AND EQUALIZATION

(A) Schedule a time for the Owner and/or Owner's representative to perform the Final Adjustment and Equalization. Notify the Owner and/or Owner's representative and Consultant at least twenty one (21) days in advance.

(B) Furnish project lead installer to assist the Owner and/or Owner's representative during the Final Adjustment and Equalization.

(C) Audio Systems acceptance tests shall employ an approved sound level meter, and spectrum analyzer and digital multi-meter to be provided by the contractor. Measurements shall be made at the combined output of the amplifiers and at selected locations throughout the facility.

(D) Video Systems acceptance tests shall employ and approved video test pattern generator, PC with min. XGA output and a 100MHz dual trace storage oscilloscope. Measurements shall be made at the point of signal origination and compared to signal at the display device. Minimum requirements at the display device shall be a rise time no greater then 7.5ns (5ns preferred) and amplitude of .7 volts.

(E) Record final settings on all equipment and submit with contract closeout documents.

8. CLEAN UP

(A) Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed on a daily basis unless designated for storage.

(B) Clean all areas around system equipment and be sure that the inside of each equipment rack is free of cut wire ends, solder splatters, and other debris.

9. DEMONSTRATIONS AND TRAINING

(A) Furnish a technician who is qualified to operate and maintain the systems specified in this Section to instruct Owner designated personnel regarding the design features and proper operation of the systems.

(B) If requested by the Owner, furnish the same technician/instructor during the first formal use of each system to further instruct and assist Owner personnel in system operation.

(C) Upon completion of the Work, the Owner and/or Owner's representative may elect to verify test data as part of the acceptance procedure. Provide personnel and equipment, at the convenience of the Owner and/or Owner's representative, to reasonably demonstrate system performance and to assist with such tests without additional cost to the Owner and/or Owner's representative.

10. FINAL PROCEDURES

(A) Perform any and all remedial work to correct inadequate performance or unacceptable conditions of, or relating to any of this work, as determined by the Owner and/or Owner's representative, at no additional expense to the Owner and/or Owner's representative.

(B) Furnish all portable and loose equipment to the Owner along with complete documentation of the materials presented. All portable equipment shall be presented in the original manufacturers packing, complete with all included instructions and miscellaneous manuals and documents.

(C) Test Reports and Certificates:

a) Document all acceptance testing, calibration and correction procedures described herein with the following information:

b) Parameters measured and their values, including values measured prior to calibration or correction, as applicable.

c) Parameters associated with calibration or corrective networks, components, or devices.

d) All software shall have certified backups and escrow provisions reviewed with the Owner and/or Owner's representative and equipment supplier.

e) Provide all operational software, configuration files, source code, and final settings and adjustment, in Compact Disc format, sleeved in the final documentation binder. The configurations, and source code become the sole property of the owner at project completion

f) A list of all equipment, indicating manufacturer, model number, serial number and equipment location (rack/room number). Update following acceptance testing if modified.

(D) Present, review and clarify all materials to the Owner and/or Owner's representative and/or operating personnel and fully demonstrate the operation and maintenance of the systems, equipment, and devices specified herein.

(E) Check, inspect, and if necessary, adjust all systems, equipment, devices and components specified, at the Owner's convenience, approximately thirty (30) days after the Owner acceptance of this work.

END OF SECTION

SECTION: 16680 - TRANSIENT VOLTAGE SURGE SUPPRESSION

I. GENERAL

1. RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.

2. SUMMARY:

A. This Section includes transient voltage surge suppressors for low-voltage power (< 600 Volts) equipment.

B. Related Sections include the following:

(1) Division 16 Section “Wiring Devices” for devices with integral transient voltage surge suppression.

(2) Division 16 Section “Panelboards” for locations which require installation at the panel or sub-panel level.

(3) Division 16 Section “Switchboards” for locations which require installation at the Service Entrance Switchboard.

3. SUBMITTALS:

A. PRODUCT DATA: For each type of product indicated. Include rated capacities, shipping, installed and operating weights, furnished specialties; and options.

B. PRODUCT CERTIFICATIONS: Signed by manufacturers of transient voltage suppression devices, certifying that products furnished comply with the following testing and labeling requirements:

(1) UL 1449 Listing classifications, and clamping voltage rating for each mode of protection.

(2) ANSI/IEEE C62.41 and C62.45 Category C3 clamping voltage.

(3) Sequential surge survivability per ANSI/IEEE C62.45.

(4) Dimensions and weights.

(5) Recommended connection wiring diagram.

C. Submittals shall include a copy of these specifications with each section marked with either “C” for comply or “D” for deviation. A written explanation shall be provided for each deviation.

D. WARRANTIES: Special warranties specified in this Section.

4. QUALITY ASSURANCE:

A. Product must be made by a company engaged in the manufacture of such devices in the USA for a minimum of five years.

B. SOURCE LIMITATIONS: Obtain suppression devices and accessories through one source from a single manufacturer.

C. PRODUCT OPTIONS: Drawings indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated. Other manufacturers' products complying with requirements may be considered by the engineer/architect greater than 14 days prior to bid. Samples may be required for approval. Refer to Division 1 Section "Substitutions".

D. 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.

E. IEEE COMPLIANCE: Comply with ANSI/IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits" and test devices in accordance with ANSI/IEEE C62.45, "IEEE Guide for Surge Suppressor Testing".

F. NEMA COMPLIANCE: Comply with NEMA LS-1 "Low Voltage Surge Protective Devices".

G. UL COMPLIANCE: Comply with UL 1449 Rev. 2 "Transient Voltage Surge Suppressors".

5. PROJECT CONDITIONS:

A. PLACING INTO SERVICE: Do not energize or connect service entrance equipment or panelboards to their sources until the surge protective devices are installed and connected.

B. EXISTING UTILITIES: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

(1) Notify Architect not less than two days in advance of proposed utility interruptions.

(2) Do not proceed with utility interruptions without Architect's written permission.

C. SERVICE CONDITIONS: Rate surge protective devices for continuous operation under the following conditions, unless otherwise indicated:

(1) Maximum Continuous Operating Voltage: Not less than 125 % of nominal system operating voltage for 120/240 Single Phase or 120/208 VAC Wye systems, Not less than 115 % for 277/480 VAC Wye or 480 VAC Delta systems.

(2) Operating Temperature: 30 to 120 deg F. (0 to 50 degrees C)
(3) Humidity: 0 to 95 %, noncondensing.

(4) Altitude: Less than 20,000 feet (6,000 m) above sea level.

6. COORDINATION:

A. Coordinate location of field mounted surge suppressors to allow adequate clearances for maintenance.

B. Coordinate location of field mounted surge suppressors to allow for the shortest ground wire possible.

7. WARRANTY:

A. GENERAL WARRANTY: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. SPECIAL WARRANTY: Written warranty, executed by manufacturer agreeing to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

8. EXTRA MATERIALS:

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

(1) Replaceable Protection Modules: One of each size and type installed for Service Entrance Units.

II. PRODUCTS

1. MANUFACTURERS:

A. AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

B. MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:

(1) Intermatic, Inc.

(2) Advanced Protection Technologies

(3) Liebert

(4) Surge Suppression, Inc.

2. SERVICE ENTRANCE SUPPRESSORS:

A. Integral LED indicator lights showing proper operation of each module, visible without opening the enclosure door.

B. Utilizing metal oxide varistor technology.

C. Internal cartridge fuses with solidly mounted fuse holders rated at a minimum of 200 KA interrupting capacity.

D. Including thermal protection for each component, which is continuously monitored.

E. Nema 3R style enclosure suitable for indoor or outdoor installation.

F. UL CLAMPING MODES: L-L, L-N, N-G.

G. SURGE CAPACITY PER MODE: 80,000 Amps (160,000 Amps industry rating).

H. SURVIVABILITY OF CATEGORY C SURGES: 1000 sequential occurrences.

I. MAXIMUM UL 1449 RATING, EACH MODE: 400 for 120/240, 120/208, 800 for 277/480 systems.

J. EMI/RFI NOISE REJECTION: 50dB Common Mode, 40 dB Normal Mode.

K. CONNECTION METHOD: Parallel.

L. UL 1449 SUPPRESSED VOLTAGE RATINGS (SVR) AS FOLLOWS:

M. PROVIDE AUDIBLE ALARM WITH EACH SUPPRESSOR

Mode	120/240 Volt Single Phase	120/208 Volt Wye	277/480 Volt Wye	480 Volt Delta
L-N	330 V	330 V	700 V	N/a
L-G	330 V	330 V	700 V	1,500 V
N-G	330 V	330 V	700 V	N/a

3. PANELBOARD SUPPRESSORS :

A. LED indicator lights for power and protective status.

B. Utilizing metal oxide varistor technology.

C. U.L. 1283 Listed. Integral EMI/RFI Filter providing up to 54 dB of attenuation from 20 kHz to 100 MHz.

D. Internal fuses rated at a minimum of 200 KA interrupting capacity.

E. Including thermal protection for each component, which is continuously monitored.

F. Integral Form C Contacts for remote indication of suppression status via connection to building management system (provided by others).

G. Nema 3R style enclosure suitable for indoor or outdoor installation.

H. UL CLAMPING MODES: L-L, L-N, N-G.

I. SURGE CAPACITY PER MODE : 30,000 Amps (60,000 Amps industry rating).

J. SURVIVABILITY OF CATEGORY C SURGES: 1000 impulses without clamping drift.

K. UL 1449 SUPPRESSED VOLTAGE RATINGS (SVR) AS FOLLOWS:

L. PROVIDE AUDIBLE ALARM WITH EACH SUPPRESSOR.

Mode	120/240 Volt Single Phase	120/208 Volt Wye	277/480 Volt Wye
L-N	330 V	330 V	600 V
L-G	330 V	330 V	600 V
N-G	330 V	330 V	600 V

III. EXECUTION

1. INSTALLATION OF SURGE PROTECTIVE DEVICES:

A. Install devices at service entrance on load side, with ground lead bonded to service entrance ground.

B. Provide multipole, 60 amp breaker as a dedicated disconnect for the suppressor at Service Entrance location, unless otherwise indicated on drawings.

C. Install devices for panelboards with conductors between suppressor and points of attachment as short and as straight as possible. Do not exceed manufacturer's recommended lead length.

D. Provide multipole, 30 Amp breaker as a dedicated disconnect for the suppressor at panelboard locations, unless otherwise indicated on drawings.

E. Mount suppressor as close to switchgear and panelboard point of connection, either surface or flush mount as required. Do not mount internal to switchgear to facilitate future maintenance and/or replacement.

F. Install the TVSS using manufacturer provided leads when provided or with #6 AWG conductors when not manufacturer provided. Conductors are to be as short and straight as possible. Conductors are to be twisted. Install in accordance with the TVSS manufacturer's recommended practice and in compliance with applicable codes.

2. CONNECTIONS:

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3. FIELD QUALITY CONTROL:

A. TESTING: Contractor shall perform the following field quality control testing:

(1) After installing the surge protective devices, but before electrical circuitry has been energized, test for compliance with requirements.

(2) Complete start-up checks and voltage verifications according to manufacturer's written instructions.

(3) Perform visual and mechanical inspection on each unit. Certify that units are installed per manufacturer's recommendations.

B. Repair or replace malfunctioning units. Retest after repairs or replacements are made.

4. DEMONSTRATION:

A. Engage a manufacturer's representative to demonstrate proper operation of the system and to train owner's maintenance personnel in proper evaluation of suppressor condition and procedure to repair or replace defective devices.

(1) Review operation and maintenance manuals.

(2) Review performance specifications of devices supplied to show they comply with specifications herein.

(3) Schedule training with Owner, through Architect or General Contractor, with at least seven days advance notice.

(4) Provide letter to owner that states units are installed per manufacturer's recommended installation procedures and system is functioning properly and warranty is initiated.

END OF SECTION

SURGE SUPPRESSION
SUBMITTAL CHECKLIST

TYPE _____

	SPEC'D	SUB
PEAK SURGE CURRENT	_____	_____
CLAMPING VOLTAGE	_____	_____
LN	_____	_____
NG	_____	_____
LL	_____	_____
OTHER	_____	_____
PULSE LIFE	_____	_____
EMI/RFI	_____	_____
SIZE MOV'S (MM DIAM)	_____	_____
NUMBER OF MOV'S/PHASE	_____	_____
MONITORING	_____	_____
CONNECTION	_____	_____
BREAKER	_____	_____
IN-LINE FUSES	_____	_____
INTEGRAL FUSES	_____	_____
FULL WARRANTY	_____	_____

SECTION 16721 – MULTIPLEXED INTELLIGENT FIRE ALARM SYSTEM

I. GENERAL

A. General

The certified fire alarm installer for this project shall be a state certified fire alarm contractor. The bidder shall include in his bid all work indicated in the specifications and drawings including but not limited to providing new fire alarm control panels, power supplies, initiating devices, notification appliances, conduit, wiring, programming, testing, and recertification.

The contractor shall program all fire alarm panels, including main panel. Certify/Re-certify fire alarm system and provide required written certification.

The fire alarm system shall be connected to the existing campus fire alarm system. The existing campus fire alarm OFF SITE MONITORING SYSTEM shall be maintained and remain fully operational throughout and after construction.

B. Specific

1. A new Notifier NFS -320 monitored intelligent fire alarm system control panel with amplifier shall be provided in the new building and shall be networked via fiber optic cable to the existing FACP in the administration building and shall be used to provide fire protection; meeting the State Uniform Building Code and other State or National Codes. New fire alarm control panels must be able to interface with existing systems without loss of communication. See drawings for fiber connection requirements. All panels will be voice upgradeable without CPU change. All initiating devices must be intelligent. Devices must NOT require any additional equipment to program devices. Contractor will provide factory certified training on new panels and programming for two Escambia County School District technicians. Service manager for technicians installing devices will have NICET level II and Florida Fire Alarm System Agent (FFASA) Certification IAW Chapter 489.5185 of Florida Statues. All programming must be done by keypad at the CPU or Laptop IAW NFPA 72.

2. The fire alarm system shall cover all existing permanent and temporary facilities and shall have expansion capabilities to accommodate future buildings including on-site portables. Install two (2) 1” conduits from panel to the outside of the area designated for future expansion and potential future portables. Portable buildings will have a dedicated monitor module that is suppressed by Edco PHC 43 when it leaves the Mechanical / Electrical room (preferred) or NEMA 3R locking box (see later sections for mounting and Grounding) hard wire for signal circuits May be shared IAW NFPA 72.

3. Stopper II (false alarm devices) shall be provided in all areas in the new Adaptive Play Facility. All devices will be smart devices.

4. A voice function shall be provided as indicated on the drawings.

5. Provide key operated remote test switches and duct detector indicators throughout the facility. These indicators and switches should be mounted 48” A.F.F. visible from floor level when duct detector is concealed above the ceiling.

6. All above ceiling fire alarm junction boxes shall be marked/colored red. Main junction boxes should be properly marked with engraved plates. Terminate with terminal strips in electrical rooms. Fiber optic cable will be used to network panels between buildings. All fiber patch cords will be protected by appropriate raceway IAW NEC 70.

7. Kitchen hood suppression system shall be monitored by a addressable monitor module shall have a dedicated zone on the fire alarm panel and be fully supervised (trouble on open or ground fault) and activate alarm on change of state. Gas valves will shut down when hood system is activated only.

8. Air handler shutdown shall occur on alarm only by addressable relay, Power shall be applied through the fire alarm to accomplish shutdown on alarm only. Field relays (shutdown devices) shall not be powered during normal operation. Duct detector relays will not be used to shut down Air handlers.

9. All wires shall be numbered at the fire alarm panel and at each junction box for identification and future expansion and troubleshooting. No "T" tapping of wiring devices is allowed. All shields shall be continuous, no grouping of shields will be allowed and all shields will be taped away from the conduit and terminated on devices where applicable.

10. Fire Alarm system will be monitored in accordance with NFPA 72 Security system wiring and fire alarm wiring shall not be pulled in the same conduits.

11. Surge protection is required where fire alarm goes underground between buildings with EDCO PHC 043 to accommodate all conductors and appropriate suppression devices in a NEMA 3R locking box. A 3/4" copper ground rod shall ground each box with #6 copper conductor and clamp Tied to Building Ground if possible.

12. Networked Fire Alarm panels will be interconnected with DX12 fiber terminated with ST hot melt connectors. Use FONS patch panel with suitable raceway to panel.

13. The fire alarm contractor shall provide all fiber, fiber connectors, make all terminations, test all fiber, etc for a complete installation. Fiber shall be a minimum 12 strand cable in a minimum 1 ¼" conduit and shall meet requirements by fire alarm system manufacturer.

C. The equipment and installation shall comply with the current provisions of the following standards:

National Fire Protection Association Standards:

NFPA 70	National Electric Code
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code

Underwriters Laboratories Inc.

Underwriters Laboratories Inc. for use in fire protective signaling systems shall list the system and all components. The UL Label shall be considered as evidence of compliance with this requirement. The equipment shall be listed by UL under the following standards as applicable:

UL 864/UOJZ, APOU	Control Units for Fire Protective Signaling Systems.
UL 1076/APOU	Proprietary Burglar Alarm Units and Systems.
UL 268	Smoke Detectors for Fire Protective Signaling Systems.
UL 1481	Power Supplies for Fire Protective Signaling Systems.

Any equipment not bearing a UL Label shall be removed and replaced with labeled equipment at the Contractors' expense.

Americans with Disabilities Act (ADA)

In the case of any discrepancy between these specifications, the project drawings, and any applicable local codes, the installed Fire Alarm System shall comply with the most stringent requirement.

D. The system and all components shall be listed by Underwriter's Laboratories for specific application as fire alarm equipment. The UL label shall be prima facie evidence of compliance with this requirement. Any equipment not bearing a UL label will be unacceptable and will be removed and replaced with labeled equipment at the Contractor's expense.

3. SUBMITTALS:

A. Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow. Complete data sheets bearing the printed logo or trademark of the fire alarm control panel manufacturer for the following equipment:

(1) Fire alarm control panels

(2) Enclosures and cabinets

(3) System power supply

(4) Standby power supply

(5) Multiplex card

(6) Initiating devices

(7) Notification appliances

(8) Automatic smoke detector

(9) Automatic heat detector

(10) Monitoring modules

(11) Duct mounted smoke detectors

(12) Shut down relays

(13) All fire alarm system cabling

(14) Any other items required by the Project Drawings or Specifications

B. Evidence of listing of all proposed equipment by UL for application as fire alarm equipment.

C. Submit a scaled "point-to-point" wiring diagram showing the connections to the equipment and terminal cabinets for all existing and new devices. Indicate the equipment numbers, terminal numbers, wire numbers, zone numbers, wire colors, junction box sizes, and conduit sizes. Include the connections for the Mechanical Systems and the Fire Detection and Alarm System. The submittal shall be made for approval prior to the installation of the wiring in the raceways. Make a clear statement that all circuits shall be terminated on terminal strips and that wire nuts will not be allowed. Electronic floor plans are available from the Engineer.

D. A custom wiring diagram for each building showing wiring to each individual appliance and device.

E. Submit voltage drop calculations for all alarm circuits.

F. Submit battery calculations for the fire alarm panel with all devices under supervisory and alarm conditions.

G. Submit voltage drop calculations for all appliance circuits exceeding 300 feet to ensure proper voltage levels.

H. Evidence of certification of the proposed fire alarm Contractor by both the State of Florida Department of Professional Regulation and one of the approved fire alarm equipment manufacturers as required herein.

I. Written certification by the fire alarm Contractor that no power supply or circuit on the system has an electrical load greater than 80% of its rated capacity.

J. No equipment shall be purchased by the Contractor for the fire alarm system until the Architect has approved the above submittals in entirety and returned them to the Contractor.

K. It is the Contractor's responsibility to meet the entire intent of the specifications. Approved submittals shall only allow the Contractor to proceed with the installation and shall not be construed to mean that the Contractor has satisfied the requirements of these specifications.

L. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING:

(1) Evidence of listing by Underwriters' Laboratories for all proposed equipment for use as Fire Alarm equipment. (Ref.: Underwriters' Laboratories, Section UOJZ).

(2) A Single Line System Block Diagram and written System Operational Overview.

(3) Complete calculations showing the electrical load on the following system components:

a. Each system Power Supply

b. Each standby Power Supply (batteries)

C Each auxiliary control circuits that draw power from any system power supply.

(4) Field Connection Drawings: A complete set of drawings, one for each Fire Alarm Control Panel module which has any external (field) wiring connected to it, and one for each system detector, module or signaling appliance, shall be supplied. The Field Connection Drawings shall be done under AutoCAD Version 12 or later. They shall be provided on computer diskette and in paper format. Building floor plans of contract sheets will be furnished on diskette to the Contractor by the Architect without charge.

(5) A copy of the Contractors Training Certification, issued by the manufacturer of the Fire Alarm Control Equipment, shall be provided. These qualification credentials shall not be more than two years old, to ensure up-to-date product and application knowledge on the part of the installing Contractor.

(6) Warranty Statement from the manufacturer shall be provided as part of the submittal package. This warranty statement will state a 3 year period of warranty for all of the products proposed for the project, and shall include the name and address of the authorized manufacturers' agent who will honor any and all warranty claims.

(7) Written Certification by the Fire Alarm Contractor that no power supply or circuit in the system has an electrical load greater than 80% of its rated capacity.

(8) A scaled plan of each building showing the placement of each individual item of fire alarm equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

4. QUALITY ASSURANCE:

A. Each and all items of the fire alarm system shall be listed as a product of a single fire alarm manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL Category UOJZ as a single control unit. Partial listing will not be acceptable.

B. All control equipment shall have transient protection devices to comply with UL 864 requirements.

C. MANUFACTURER'S QUALIFICATIONS: All fire alarm equipment shall be the product of one manufacturer. System appliances and devices not manufactured by the control panel manufacturer shall be products regularly distributed by the control panel manufacturer and cross-listed by Underwriter's Laboratories for compatibility with the system control panel. Equipment meeting all requirements of these specifications and

distributed by the following original equipment manufacturers will be acceptable: Notifier or Edwards.

Equipment by other manufacturers will only be considered if written request accompanied by supporting documentation establishing equivalent levels of quality and performance is submitted to the Architect 10 days prior to the date of bid opening. By submission of equipment by an alternate manufacturer for consideration, the submitter accedes that the final decision of the Architect as to whether the alternate equipment is of equivalent quality and performance level will be final and binding on all parties.

D. INSTALLER'S QUALIFICATIONS: The installation and testing of all components of the system shall be performed by a Contractor holding a current certification issued by the State of Florida Department of Professional Regulation. The Contractor shall be certified as either an Alarm System Contractor – Type 1 or an Unlimited Electrical Contractor in accord with Chapter 489.505 of the Florida Statutes and the Rules of the State of Florida Department of Professional Regulation Electrical Contractors Licensing Board (Chapter 21GG).

The fire alarm Contractor shall be an experienced firm regularly engaged in the layout and installation of automatic fire alarm systems. The Contractor shall have successfully completed the installation, testing, and warranty of systems of the scope of the largest system on this project at least five years prior to bid, and have regularly engaged in the business of fire alarm systems contracting continuously since.

The fire alarm Contractor shall have been certified by the State of Florida Department of Professional Regulation to install fire alarm systems, have been NICET Level II certified, and certified by one of the above listed approved equipment manufacturer to perform installation, testing, adjustment, maintenance, and repair on the approved manufacturer's equipment prior to the date of bid. The proposed fire alarm Contractor shall commence no work on the project until he furnishes evidence, satisfactory to the aforementioned certifications and receives notice to proceed with the installation from the Architect.

The fire alarm Contractor shall have an office located within 25 miles of the project location and the office shall be staffed with full-time service technicians. The office shall have been established and maintained for a minimum of five consecutive years prior to bid.

E. Firms shall have be factory authorized service organization and stock spare parts.

5. WARRANTY AND MAINTENANCE:

A. The Contractor shall supply a 3-year warranty from date of commissioning for all Control System and Field Devices and appliances. The Contractor shall warrant the installed fire alarm system to be free from defects of material and installation for a period of 3 years from acceptance by the Architect. Any deficiencies shall be immediately corrected at no additional cost to the Owner. The Contractor shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the Owner notifying the Contractor. Other defects shall be repaired within 48 hours of the Owner notifying the Contractor.(Contractors name and address)

II. PRODUCTS

This Fire Alarm System Specification must be conformed to in its entirety to ensure that the installed and programmed System will function as designed, and will accommodate the future requirements and operations required by the building Owner. All specified operational features will be met without exception.

1. SYSTEM OVERVIEW AND DESCRIPTION:

   A. The Fire Alarm System supplied under this specification shall be an Edwards, Notifier, or Pyrotronics system. The system shall utilize independently addressed, and microprocessor-based smoke detectors, heat detectors, and modules as described in this specification.

   B. The fire alarm system shall be fully supervised for the detection and reporting of the derangement of any component or circuit on the system. Signaling Line Circuits shall provide the level of performance designated as, (Class A) Style 6 by UL and the NFPA. Indicating circuits shall provide the level of performance designated as Style Y by UL and the NFPA.

   C. A standby power supply shall automatically supply electrical energy to the system whenever the primary power supply fails to provide the minimum voltage required for proper system operation. The standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for 24 Hours in Standby and then be capable of operating the system for 15 Minutes in the alarm mode.

2. GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS**:** All equipment furnished for this project shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use and shall be provided by a single manufacturer.

3. FIELD PROGRAMMING: The system shall be programmable, configurable and expandable in the field without the need for special tools or PROM programmers and shall not require replacement of memory ICs. All programs shall be stored in non-volatile memory.

4. CONTROL PANEL: All control panels shall be new. All control panels shall be an Edwards EST3 control panel or approved equal by Notifier or Pyrotronics. All control panels shall have fiber network capability.

5. SYSTEM PROTECTED PREMISES CIRCUIT INTERFACE**:** An Electronic Loop Controller (SLC) shall be provided in each Fire Alarm Control Panel to interface between the panel and the intelligent Detectors and modules. Each SLC shall have a minimum of 20 spare sensor addresses and 20 spare module addresses for future expansion.

   A. The communications format used by this controller shall be 100% digital.

6. Addressable Devices - General

A. Detectors shall be intelligent and addressable, and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuits.

B. Addressable smoke and thermal detectors shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. If required, the flashing mode operation of the detector LEDs shall be optional through the system field program. An output connection shall also be provided in the base to connect an external remote alarm LED.

C. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.

D. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.

E. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.

F. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.

G. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

F. Addressable Pull Box (manual station)

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

3. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

G. Intelligent Photoelectric Smoke Detector

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

H. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised Initiating zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs for portables only.

2. The monitor module shall mount in a 4-inch square , 2-1/8 inch deep electrical box.

3. The Initiating zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

I. Addressable Relay Module

1. Provide addressable relay modules for fan shutdown and other auxiliary control functions.

2. The relay module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.

7. SYSTEM WIRING:

A. All wiring shall be installed according to NEC 2008 standards per the drawings submitted by the authorized Architect Systems Distributor, unless otherwise noted.

B. RACEWAYS AND OUTLET BOXES: Shall comply with all other applicable Division 16 Specifications. Wiring shall be in metallic conduit solely for the fire detection and alarm system. Minimum raceway size for the fire alarm system shall be 3/4". The complete raceway system shall be grounded and bonded in accord with the requirements of the NEC. Outlet boxes shall be installed in the approximate locations indicated on the Drawings. It is the responsibility of the Contractor to ensure that the final locations of fire detectors and other initiating and indicating appliances and devices comply with all applicable codes.

C. CONDUCTORS AND TERMINATIONS: Shall be copper with type THHN/THWN insulation. Minimum conductor size shall be #14 AWG except that signaling line circuit (SLC) loops shall be wired with UL listed type FPL cable comprised of a jacketed and electrically shielded pair of conductors #16 AWG or larger. If stranded conductors are used, they shall comply with Sections 760-16(c), 760-28(a), and 760-30(a) of the NEC.

D. All circuits shall be identified using a unique conductor insulation color throughout the system for each type of circuit.

All wiring shall be tagged, numbered, color-coded and terminated on terminal blocks in the cabinets, in boxes, at equipment and at devices. Wire nuts or splices shall not be used. Each set of zone conductors shall be tagged with the zone number on each conductor at termination (each end) and in each junction or pull box in the raceway

system.

Speakers	Red and Black
Pull Stations, Heat Detectors, Smoke Detectors	Blue and Yellow
Flashing Lights	Brown and Orange
Air Handler Shut Downs	Purple and White
Door Holders	Gray and Tan

E. Termination of conductors shall be by means of factory wiring terminals or factory pigtails.

F. Initiating data cable shall be Style 6 (Class A) wiring (looping to all devices) with no “T” Taps. No return conduit is required.

8. Mounting of fire alarm pull stations shall be 48" above finished floor to the top of the box. (ADA Code)

9. Junction boxes and cabinets for the Fire Alarm System shall be painted International "FIRE RED".

10. CIRCUIT PROTECTORS: Shall have a line-to-line response time of less than one nanosecond capable of accepting greater than 2000 amps at 28 volts. Line-to-earth response time shall be less than one nanosecond with a maximum current of 2000 amps (35 joules each line) to earth. Shield to earth current shall be 5000 amps maximum. Spark gap devices or devices incorporated in or installed within the fire alarm control panel in lieu of the specified protector are not acceptable.

III. EXECUTION

1. The entire system shall be installed in a workmanlike manner in accordance with approved manufacturers manuals and wiring diagrams. The Contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the NEC, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.

2. End of Line Resistors: Shall be furnished as required for mounting as directed by the manufacturer.

3. INSTALLATION OF CONTROL PANEL AND RELATED EQUIPMENT:

A. Installation of all Fire Alarm Control Equipment and Field Mounted Devices and Appliances shall be in strict compliance with the manufacturer's written instructions.

B. Connection of the fire alarm system power supply (supplies) to the electrical system shall be by a dedicated branch electrical circuit. The means to disconnect this circuit shall be accessible only to authorized personnel, shall be capable of being locked in the "on"

position, and shall be clearly marked "FIRE ALARM CIRCUIT CONTROL" in accord with NFPA standards.

C. Batteries shall only be installed in the control panel enclosure when they are of the gelled-electrolyte type and where the control panel manufacturer recommends such installation.

D. The Control Equipment shall not be installed until all field wiring to the field mounted devices and appliances have been installed and the wiring on those circuits have been checked for faults and shorts, and any faults and shorts found have been corrected.

E. The Fire Alarm Contractor shall neatly lace all field wiring conductors in the gutter spaces of the control panels and secure the wiring away from all circuit boards and control equipment components. All field-wiring circuits shall be neatly and legibly labeled in the control panel. No wiring except homeruns from fire alarm system circuits and system power supply circuits shall be permitted in the control panel enclosure. Additionally, no wiring splices will be permitted in the control panel enclosure.

F. Fan shut down relays. **Only addressable control relays will be allowed.**

4. FIELD QUALITY CONTROL: The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

5. TESTS: Upon completion of the installation, the Contractor and the manufacturer's authorized representative together shall test the completely installed fire alarm system. The system will be fully tested in compliance with Testing Procedures for Signaling Systems (ANSI/NFPA 72H). The Owner and designated representative shall be given the opportunity to witness these tests. An itemized test report shall be submitted to the Owner, detailing and certifying all results.

6. The Fire Alarm Contractor shall test:

A. Every alarm initiating appliance and device for proper response and program execution.

B. Every indicating appliance for proper operation and audible/visual output

C. All auxiliary control functions such as elevator capture, smoke door and damper release, and functional override of HVAC, ventilation, and pressurization controls.

7. The Architect shall be notified at least 10 working days prior to the scheduled testing so that he/she may be present for such testing. The testing will only be scheduled after “As-Built” Drawings are turned in with the Affidavit of True and Correct As-Built Drawings fully executed. Find blank affidavit at the end of this section.

A. After the system has been completely tested to the satisfaction of the Architect, and the building Owner; the Fire Alarm Contractor shall complete the Fire Alarm System Certification of Completion form published by the NFPA (Figure 1-7.2.1 in the National Fire Alarm Code). In compliance with published NFPA standards, parts 1, 2, and 4 through 10 shall be completed after the system is installed and the wiring has been checked. Part 3 shall be completed after the operational acceptance tests have been completed. The completed form signed by

the qualifying agent of the Fire Alarm System Contractor shall be delivered to the Architect with the other system documentation required by these specifications.

8. **OFF SITE MONITORING OF SYSTEM**
30 days prior to substantial completion of the project, the fire alarm contractor shall have the off site monitoring function activated and working properly. The connection of the fire alarm system for the new work shall be accomplished by substantial completion.

9. DELIVERY OF SYSTEM DOCUMENTATION PACKAGE: The Fire Alarm Contractor shall deliver two sets of the System Documentation Package to the Building Owners Representative and the Local Authority Having Jurisdiction. Final payment of the Contractor will not be authorized until the complete documentation specified herein is delivered to the Architect. The System Documentation Package shall consist of the following documents, to be provided after the fire alarm system has been completely installed and tested:

   A. Operations and Maintenance Manuals that detail the operation and maintenance of the installed System. An "As-Built" copy of the scaled plan of each building showing the actual installed location of each piece of fire alarm equipment as well as the installed raceway sizes and routing, conductor sizes and quantities in each raceway, and the exact location of each junction box. The Affidavit of True and Correct As-Built Drawings shall be fully executed and turned in with "As-Built" drawings (as shown at the end of this section).

   B. Point to Point diagrams of the entire System as installed and tested. Point-to-Point Diagrams shall include all connected Smoke and Heat Detectors and addressable Field Modules, including device address.

   C. The application program (database) listing for the system as installed at the time of acceptance by the building Owner and/or Local AHJ (Disk and Hard copy printout).

   D. A letter certifying that the installation is in strict compliance with all applicable codes and in strict compliance with the requirements of these specifications.

   E. Two originals of the NFPA document titled "Fire Alarm System Certification and Description" completely filled-in and signed as required.

   F. Name, address, and telephone of the authorized factory representative.

   G. Written certification by the fire alarm Contractor that no power supply audio amplifier or circuit on the system has an electrical load greater than 80% of its rated capacity.

   H. Copies of the manufacturers' 3 year warranty on all the system components.

10. SYSTEM STARTUP: A Factory Trained and Authorized Architect Systems Distributor shall perform system Startup. A Contractor under the direction of the Factory Trained and Authorized Architect Systems Distributor may perform certain functions of the Systems Startup Procedure.

11. INSTRUCTION OF OWNER: The Fire Alarm Contractor shall schedule and execute an instruction class for the Building Owner, which details the proper operation of the installed fire alarm system. The instruction shall also cover the schedule of maintenance required by NFPA

72H and any additional maintenance recommended by the system manufacturer. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is thoroughly familiar with the installation.

12. Provide in a frame and under glass, computer generated, color-coded diagram of the building and site, indicating the zones by number. Install frame near the fire alarm control panel or the annunciator panel located at main entry corridor.

13. WARRANTIES: The Contractor shall warrant the complete fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of 3 years specified herein from the date of placing the completed system in operation. The conductors shall be replaced on any loop that exhibits repeated ground faults. If the ground faults persist, each device on that loop shall be replaced. These repairs are to be considered warranty work and shall be performed at no additional cost to the Owner.

14. Furnish 3 bound copies of brochure including maintenance instruction, spare parts list, wiring diagram and trouble shooting check list

END OF SECTION

Affidavit of True and Correct As-Built Drawings

County of _____
State of Florida

Whereas, the undersigned Installing Contractor having been heretofore employed by Escambia County School District directly or as a sub-contractor to furnish certain material and services, to wit:

Fire Alarm Equipment, panels, switches and/or controls, wires and cables, electrical race ways, conduit fixtures in boxes, wiring devices, lighting fixtures and/or other electrical materials, supplies, goods, wares, merchandise and equipment along with labor and appropriate services to install.

On the following described real property:_____

Now, therefore, the undersigned, in requesting final inspection and acceptance, does submit ___ number of true and correct as-built drawings consisting of _____ number of sheets, dated _____. The enclosed as-built drawings show every raceway, junction box, notification appliance, alarm initiating device, terminal cabinet, electrical branch circuit, conductor type, conductor purpose, conductor size and fiber-optic cable. Furthermore, if it is ever discovered that the as-built drawings submitted here unto are in error and not completely accurate, corrections will be made at the expense of the Contractor or sub-contractor who is responsible for the mistake or omission.

Signed, sealed and delivered this ___day of _____, _____.

By_____ Installing Contractor

Qualifying Agent _____ FL Lic. No._____ Title _____

Now, therefore, the undersigned Fire Alarm Equipment Manufacture/Authorized Fire Alarm Equipment Distributor, in requesting final inspection and acceptance, does submit ___ number of true and correct as-built drawings consisting of _____ number of sheets, dated _____. The enclosed as-built drawings show every device, connection, address, termination, power supply, annunciator, dip-switch, and jumper setting of each device provided for this contract, or an electronic as-built drawing produced by each individual SLC, of the system, showing device type, assigned address, serial number, and detector base type. Furthermore, if it is ever discovered that the as-built drawings submitted here unto are in error and not completely accurate, corrections will be made at the expense of the Contractor or sub-contractor who is responsible for the mistake or omission.

Signed, sealed and delivered this ___day of _____, _____.

By_____ Manufacture/Authorized Distributor
Qualifying Agent _____ FL Lic. No._____ Title _____

SECTION: 16760 – INTERCOM SYSTEM

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. The following general specifications shall apply to the intercom system and all components thereof. Associated work specified in other sections:

16100 - Electrical
16680 - Transient Voltage Surge Suppression

1.2 DESCRIPTION

A. The Contractor shall provide all material and labor as required to provide a complete and operational intercom system. The Contractor shall include in the base bid all cost associated with providing all intercom system including but not limited to interior speakers, exterior speakers, call-switches, cabling, conduit, surge suppression, etc. All work at the head-end equipment including terminations, connections, and installation of new equipment in the existing intercom system master console shall be performed by the School District of Escambia County Maintenance Department Electronics Shop. Coordinate all intercom system work with Vince Childers, Electronics Shop Supervisor.

The existing intercom system is Rauland MCZ300 with switchbanks. The scope of work for expansion or replacement is indicated on the drawings. The system shall consist of the central control panel/amplifier, remote 2-way speakers, and interconnecting wiring. All new remote stations shall be wired in this contract for light annunciated call-in capability.

1.3 QUALITY CRITERIA

A. The components included in this specification shall be the product of Rauland Corporation a manufacturer of established reputation who has designed and produced similar equipment for a period of at least ten (10) years.

1.4 SUBMITTALS

A. The Contractor shall supply a complete set of working drawings, engineering data sheets, and instruction manuals of the system and its components. Also included shall be a scaled building plan with all devices, conduit and wiring shown plus a point-to-point wiring schematic showing Junction box labels by room with a riser diagram identifying room to speaker w/ call in connections by room location and connection to the main equipment terminals and any Intermediate junction box locations.

1.5 PRE-WORK REPORT

A. The existing intercom system was operational at the time of the design site survey. The Contractor shall examine the existing system and file a written pre-work report stating the existing system operational conditions with any known deficiencies listed.

1.6 CLASS CHANGE TONES

A. Class change tone shall be controlled by the master clock.

B. A tone generated through the intercom will be used for class change.

PART 2 - PRODUCTS

2.1 CENTRAL CONTROL PANEL/AMPLIFIER

A. The standard intercom master unit is a Rauland MCZ300 powered by PSX 300. All interconnections between amps, consoles, switch banks, etc. shall be made with 18-gauge stranded control cable. All wiring between the intercom switch banks, and all buss wiring shall be continuous; no crimped connections will be accepted all occupied areas shall be connected to SWL 25 switch banks. Elementary schools will be connected to SWL 25 Switch banks. All amplifiers will be Bi-Amp MPA 250. All/any space more than ½ inch will be cover with Rauland blank panel. The equipment shall include all amplifier(s), power supplies, and accessories as required for a complete operable system as described herein.

2.2 REMOTE SPEAKER STATIONS:

A. WALL MOUNTED SPEAKERS CLASSROOMS, MULTI-PURPOSE ROOMS, OFFICES: The wall mounted speakers in these spaces shall be recessed mounted and shall be as indicated on drawings. Complete mounting hardware shall be included with the speaker assembly.

B. WALL MOUNTED SPEAKERS IN GYMNASIUM: The loudspeaker shall be Speco SPC30 RT with metal wire guard set at 30 watt or approved equal. Wire guard shall be provide by the manufacturer.

C. EXTERIOR SPEAKERS: The loudspeaker shall be Speco SPC30 RT set at 30 watt or approved equal, double re-entrant type, and shall provide the following power impedance settings:

Position	Z Ohms	Watts (@25V)
1	2500	1.8
2	1300	3.7
3	666	7.5
4	333	5.0
5	167	30.0

Loudspeaker dispersion shall be 120 degrees horizontal x 60 degrees vertical. The speaker shall be of weatherproof construction with heavy-gauge plastic or spun aluminum and structural aluminum dies casing. The driver unit shall be mounted within a waterproof housing and all exposed parts shall be of stainless steel or be plated and sealed. There shall be a weatherproof power-impedance selector switch for obtaining the impedances indicated

above. The loudspeaker assembly shall be furnished with a position locking all-purpose mounting bracket that permits the speaker to be rotated in both the horizontal and vertical planes.

D. CEILING SPEAKERS: The Speaker shall be a Rauland Model USO188 - 8" loudspeaker without external volume control, mounted on a painted aluminum face, supported by appropriate plate or bar hanger in accordance with NEC 70 complete with a 25V/70V line matching transformer tapped at 5/16, 5/8, 1-1/4, 2-1/2, and 5 watts. The speaker frequency response shall be 65 to 17,000Hz, with an axial sensitivity of 93dB at one meter with one-watt input. The power rating shall be 8 watts. The speaker shall incorporate a 5.0 oz. ceramic magnet; the voice coil shall be 0.75" diameter and shall have an impedance of 8 ohms.

2.3 CALL-IN SWITCH

A. The call-in switch shall be Rauland or equal. It shall consist of a single pushbutton secured to a stainless steel wall plate for mounting to a standard, flush, or surface mounted, single gang electrical box. The button shall be of the momentary contact type providing single closure while depressed. The wall plate shall bear the designation PUSH TO CALL. External connections shall be to screw terminals.

2.4 WIRING

A. All intercom wiring shall be in conduit. All work shall be concealed. All wiring within the new construction / addition shall be for system wiring, use all Aqua Seal AQC 357 intercom coded, 22-gauge stranded, shielded voice pair with overall bell foil shield. All wiring from each wing terminal cabinets to the console shall be Multi-paired use West Penn 438, 27 Pair, Individually shielded with overall bell foil shield multi-pair cable with ground of sufficient size plus 20% spare for future. At terminal cabinet, screw type terminals shall be used with each terminal labeled with the assigned administrative room designation for the respective station. The exact cables and surge suppression submitted shall be certified as meeting all recommendations of the manufacturer. Terminal strips shall have a maximum of two conductors per terminal and no splices are permitted No Punch blocks or crimped devices allowed.

2.5 Surge suppression for surge suppression required entering and leaving each building refer to section 16760, III. 8.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall furnish and install in accordance with specification Section 16100, conduit, junction boxes, etc., to satisfy the intent of the specifications. Installation of the intercom equipment shall follow the manufacturer's recommendations. For middle and High Schools, the system shall be wired for channel B isolation. All inside speakers shall be wall

mounted 6” below the finished ceiling or 8 feet high maximum. Call in switches shall be at least four (4) feet from the floor and terminated behind speaker enclosure Atlas/Soundolier WD417-72 or equivalent with 71B wire nuts or equivalent. Call button shall be momentary normally open without privacy function. Faceplate shall be of durable material covering a single switch box opening, i.e., Rauland RS 507 or equivalent. Non-insulated wire is not to be used for an active conductor or for a common for the call return. For larger areas, do not use more than three speakers at one (1) watt per station, minimum one speaker per 600 square feet of area. All standard classroom connections shall be .625 or 1/2 watt tap. Connections shall be made with wire nuts; crimped connectors and punch blocks are not allowed.

3.2IDENTIFICATION

A. Each terminal shall be identified at the console with the administrative room designation.

3.3 SEALING

A. Speaker enclosures, which recess into air plenums shall be caulked at all knockouts and at perimeter adjacent to wall finishes under baffle to prevent air movement and leaks through or around this opening and devices.

3.4 TESTING

A. The system shall be adjusted and tested, and left in satisfactory operating condition. Any equipment found to be defective shall be replaced at no additional cost to the Owner.

3.5 WIRING

A. Final room numbers at all terminal strips and at the main console shall identify all wiring. All terminal cabinet locations shall include terminal strips for ease of identification and for checkout. The intercom sub-contractor shall install all intercom connectors. There shall be stub outs for future expansion of intercom systems in case of future additions to the facility.

3.6 The Contractor shall connect new areas and classroom stations as directed by the School Principal to give administrative uniformity to blend new additions into current geographical arrangement at the console. Existing relocation of station wiring at console may be required.

3.7 All numerals on the console shall be renumbered by mechanical means to incorporate all classrooms with the existing in a uniform system as designated by the Principal.

3.8 All wiring and surge suppression should be located in a Mechanical / Electrical room before wire leaves the building. Intercom connections leaving the building will be protected by surge suppression, Edco COHP 50 or higher for voice circuits, Edco COHP 15 for call in circuits, mounted on Edco TBLK 12 or TBLK 25, mounted to ¾ inch plywood backboard. One ea 10 foot x ¾ copper ground rod connected to # 6 THWN copper bond to grounding rail and building ground if possible with suitable clamps. Surge suppression boxes will be mounted in electrical or mechanical rooms if possible not to exceed 6 feet A.F.F. of the. When surge suppression is mounted in a wet location, Use 16 x 16 x 6 Lockable NEMA 3R box, no holes will be drilled in

the top of the box. All entry and exits will be watertight. No Punch down blocks allowed and shall be certified as meeting manufacturer's recommendations.

END OF SECTION

SECTION 17000 - COMMUNICATIONS STRUCTURED CABLING SYSTEM

PART 1 – GENERAL

1.1 CONTRACTOR QUALIFICATIONS

The Structured Cabling System Contractor shall be an experienced firm regularly engaged in the layout and installation of structured cabling systems of similar size and complexity as required for this installation. The Structured Cabling System Contractor, under the same company name, shall have successfully completed the layout, installation, testing and warranty of not less than five Structured Cabling Systems of the scope of the largest system on this project for a minimum period of three years prior to the bid date, and shall have been regularly engaged in the business of Structured Cabling Systems contracting continuously since. The Structured Cabling System Contractor shall have an existing permanent office located within 75 miles of the job site from which installation and warranty service operations will be performed.

The Structured Cabling System Contractor shall be in good standing with the Structured Cabling System Manufacturer as a Panduit Certified Installer. The Structured Cabling System Contractor shall complete the Structured Cabling System Manufacturer's Certified Installer training program. The Structured Cabling System Manufacturer shall require that not less than two permanent employees of the Structured Cabling System Contractor each complete the full certification program. Each Certified Installer shall attend re-certification classes every two years. The Structured Cabling System certified employees shall include not less than one designer and one installation supervisor. The Structured Cabling System Contractor shall present, with his bid, the names and credentials of the Panduit certified installers who will be responsible for this project.

In addition, the Structured Cabling System Contractor shall present, with his bid, the name and certification number of a BICSI certified Registered Communications Distribution Designer (RCDD) who is a permanent employee of the Structured Cabling System Contractor. The Structured Cabling System Contractor shall maintain this RCDD, or another RCDD approved by the Engineer, in his permanent employment throughout this project. The RCDD shall have overall responsibility for certifying that the installed structured cabling system conforms to these contract documents and to the referenced EIA/TIA, IEEE, BICSI, and UL standards. Specific requirements for the RCDD are as follows:

1.1.1 The RCDD shall be, in the judgment of the Engineer, thoroughly experienced in the design, layout, and installation of structured cabling systems of similar size and complexity as required for this installation. The RCDD shall submit evidence of these qualifications to the Engineer upon request.

1.1.2 The RCDD shall affix his stamp to the Contractor's pre-installation submittal drawings, indicating that he has reviewed and approved the drawings for conformance to the contract documents and to the referenced codes and standards.

1.1.3 The RCDD shall periodically visit the site and inspect the work in progress. RCDD site visits shall be made not less than once per month when the job is in active progress. The RCDD shall prepare a field report for each site visit for submission to the Engineer.

1.1.4 The RCDD shall sign off on all copper and fiber optic cable test results, indicating that he was in

responsible charge of all cable testing procedures and that all cables were tested in compliance with the contract documents and met or exceeded the requirements stated therein.

1.1.5 The RCDD shall affix his stamp to the Contractor's as-built drawings, indicating that he has reviewed and approved the drawings as being complete, accurate, and representative of the system as actually installed.

1.1.6 The RCDD shall be present for and participate in not less than two hours of user training.

1.1.7 Contractor Qualifications – Conduit Installation:

All conduit and related work shall be provided by the project electrical contractor using tradesmen who are skilled and experienced in the types of conduit installations indicated in the bid documents.

1.1.8 Contractor Qualifications – Instructional Television System Installation:

The Structured Cabling System Contractor shall assign a lead technician to oversee the installation of the Instructional Television (ITV) System for this project. The ITV System lead technician shall be thoroughly skilled and experienced in the installation and configuration of the ITV components required for the project. The ITV System lead technician shall attend the pre-construction conference, construction progress meetings as required, along with all close-out and training meetings.

The ITV System lead technician shall periodically visit the site and inspect the work in progress. Lead technician site visits shall be made not less than once per month when the job is in active progress. The ITV System lead technician shall prepare a field report for each site visit for submission to the Engineer.

The ITV System lead technician shall sign off on all cable and system test results.

The ITV System lead technician shall be present for and participate in not less than four hours of user training

1.1.9 Definitions

CM - Construction Manager
DB - Design Build Contractor
GC - General Contractor

Where the three terms CM, DB, and GC are used in the specifications and TEL drawings they are used interchangeably. The Contractor shall understand the terms to mean the construction entity in overall charge of the project, whether a CM, DB or GC.

1.2 PROOF OF CONTRACTOR QUALIFICATIONS

The Structured Cabling System Contractor shall provide the following documentation, to be presented with his bid to the GC and following bids to the Owner within three working days of a request, as evidence that the requirements for Structured Cabling System Contractor qualifications listed above are satisfied. The Structured Cabling System Contractor shall meet the

requirements of this specification section for structured cabling system work. All work under this section shall be performed by permanent employees of the Structured Cabling System Contractor listed on the bid form, and shall not be performed by another subcontractor, employees of another company, or by temporary employees. The only exceptions to these requirements shall be for conduit work, which may be performed by an electrical contractor meeting the minimum requirements of paragraph 1.1.7.

1.2.1 Provide a list of not less than five (5) references for jobs of similar size and complexity including project name, location, contact person and phone number.

1.2.2 Provide RCDD name, BICSI certification number, and qualifications.

1.2.3 Provide location of existing permanent office from which installation and warranty work will be performed.

1.2.4 Provide copies of certificates issued by Structured Cabling System Manufacturer proving that the Structured Cabling System Contractor is in good standing with the manufacturer as a Certified Installer, and that the Structured Cabling System Contractor can offer the Owner a 20 year system warranty in partnership with the Structured Cabling System Manufacturer.

1.3 RELATED REQUIREMENTS

Drawings and general provisions of Contract apply to this section.

Electrical Specification Sections regarding conduit and raceway apply to work under this section, with the additions and modifications specified herein and on the TEL drawings. The special requirements indicated on the TEL drawings and in this specification section for structured cabling system conduit and all cable pathways shall take precedence over any requirements specified in Electrical Specification Sections.

1.4 DESCRIPTION OF WORK

The work consists of all labor, materials, equipment and services necessary to provide, install, test and certify all systems as described in the contract documents. The Structured Cabling System Contractor shall provide systems complete and ready for operation. The installation shall include all accessories and appurtenances required to provide a complete and operational system. Any materials not specifically mentioned in these specifications or not shown on the drawings, but required for a complete and finished installation shall be furnished and installed at no additional cost to the Owner.

1.4.1 Special Warranty – Structured Cabling System:

The Structured Cabling System Contractor and The Structured Cabling System Manufacturer shall provide a 20 year warranty for the completed Structured Cabling System. The 20 year warranty shall commence on the date of Final Completion and Final Acceptance by the Engineer and the Owner.

The installed system shall be Panduit Certified and shall meet or exceed all performance criteria established by TIA/EIA Category 6 and ISO/IEC 11801 Class E standards for unshielded UTP cabling. The electrical performance of all UTP cabling shall be characterized to 250 MHz and

proven by field testing of the Permanent Link.

The 20 year warranty shall cover the Structured Cabling System end-to-end and shall include parts and labor costs for replacement of defective parts or installation. The warranty shall also cover applications including TIA/EIA Categories 3, 4, 5, 5E, ISO/IEC 11801 Class C or D, IEEE 802.3ab Gigabit Ethernet, plus all future applications approved to run on Category 6 and Class E cabling systems. The performance parameters guaranteed by The Structured Cabling System Manufacturer in published literature shall be based on worst case testing of a channel configuration using a 100 meter model constructed using four connection points consisting of a horizontal cross-connect, a consolidation point and a work area outlet.

The Structured Cabling System Contractor shall provide all necessary documentation to the Structured Cabling System Manufacturer required to properly register the system with the manufacturer for warranty purposes.

1.4.2 Scheduling:

The Structured Cabling System Contractor shall become thoroughly familiar with the overall project schedule, and shall complete his work and make all systems fully operational prior to the date of occupancy of the facilities by the Owner.

The Structured Cabling System Contractor shall coordinate all work with the General Contractor and the Electrical Contractor, as well as all other trades.

The Structured Cabling System Contractor shall be responsible for coordinating all work related to cable pathways indicated on the TEL sheets, even if that work is being performed by the project electrical contractor. The Structured Cabling System Contractor shall inform the General Contractor if:

1) The conduit work is not being completed in accordance with the requirements indicated on the TEL drawings and this specification.

2) The conduit work is not being completed in such a manner that will allow the Structured Cabling System Contractor to complete his work in a timely manner in accordance with the project schedule and this section

The Structured Cabling System Contractor shall provide adequate training of the Owner's forces prior to the date of occupancy, and shall provide follow-up training after occupancy. Total training time shall be as prescribed by this specification is considered a minimum requirement.

1.5 EXAMINATION OF SITES AND TOTAL SYSTEM RESPONSIBILITY

Prior to providing a proposal for this work, the Contractor shall visit the proposed site of work to become familiar with any condition that may affect the work to be performed in any way. No allowances shall be made because of lack of knowledge of these conditions.

The Contractor shall have total system responsibility to assure a fully operational system. Any additional labor and components required for the installation of complete operating systems but not specifically required by the bid documents shall be provided and the cost borne by the Contractor.

The Contractor shall remain the sole owner of the system and all of its components provided under this contract and is responsible for all risk of loss or damage of the system for the entire contract period up to and including the date and time of Final Acceptance by the Engineer and the Owner's Project Manager. After the date of Final Acceptance, the Owner shall assume full ownership of the system with all components, and the warranty period shall commence.

1.6 QUALITY ASSURANCE

Materials shall be new and shall be the best of their respective kinds. All work shall be accomplished in a workmanlike manner in keeping with the best practices and highest standards of the telecommunications industry.

Protect materials and equipment from physical or environmental damage during shipping, storage and installation. Equipment and materials shall be received at the site in new condition and shall be maintained in new condition throughout the installation process. Damaged or deteriorated equipment and materials will not be acceptable. The Contractor shall be responsible for the safety and condition of all materials and equipment, whether stored or installed, until Final Acceptance by the Engineer and the Owner.

1.7 CODES AND STANDARDS

All work done under this contract shall be performed in accordance with the most recent issue of the following codes, standards and guidelines. Where there is a perceived conflict between a standard or guideline and the contract documents, the Contractor shall perform the work as directed by the Engineer.

NFPA 70	National Electric Code - 2014 Edition
NFPA 90A	Standard for the installation of Air-Conditioning and Ventilating Systems – current edition
NFPA 101	Life Safety Code - current Edition
FBC	Florida Building Code – 2017 Sixth Edition Florida Fire Prevention Code - Sixth Edition Florida Building Code Accessibility – 2014 Sixth Edition
TIA	Telecommunications Industry Association, current edition of each standard at the time of bids applies (regardless of edition indicated below)
TIA-568.0-D	Generic Telecommunications Cabling for Customer Premises
TIA-568.1-D	Commercial Building Telecommunications Infrastructure Standard
TIA-568.2-D	Balanced Twisted-Pair Telecommunications Cabling and Components Standard
TIA-568.3-D	Optical Fiber Cabling and Components Standard

TIA-568.4-D	Broadband Coaxial Cabling and Components Standard
TIA-569-D	Telecommunications Pathways and Spaces
TIA-598-B	Optical Fiber Cable Color Coding
TIA-526	Standard Test Procedures for Fiber Optic Systems (Singlemode Fiber Optical Power Loss measurement TIA-526-7 Revision A 2015 and Multimode Fiber Optical Power Loss measurement TIA-526-14 Revision C 2015).
TIA-606-C	Administration Standard for Commercial Telecommunications Infrastructure
TIA-607-C	Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
TIA-758-B	Customer-Owned Outside Plant Telecommunications Infrastructure Standard
TIA-862-B	Structured Cabling Infrastructure Standard for Intelligent Building Systems
IEEE	Institute of Electrical and Electronics Engineers
	IEEE 802-2001, IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture
IEEE	LAN/MAN Bridging & Management (802.1)
	IEEE 802.1f-1993, IEEE Standard for Local and Metropolitan Area Networks: Common Definitions and Procedures for IEEE 802 Management Information
	IEEE 802.1h, 1997 Edition (R2001) (ISO/IEC TR11802-5: 1997), IEEE Technical Report and Guidelines--Part 5: Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks
	IEEE 802.1b, 1995 Edition (ISO/IEC 15802-2-1995), IEEE Standard for Information technology--Telecommunications and information exchange between systems--IEEE standard for local and metropolitan area networks--Common specifications--Part 2: LAN/MAN Management
	IEEE 802.1d, 1998 Edition (ISO/IEC 15802-3:1998, IEEE Standard for Information technology--Telecommunications and information exchange between systems--IEEE standard for local and metropolitan area networks--Common specifications--Media access control (MAC)

Bridges

IEEE 802.1t-2001, Amendment to IEEE Std 802.1D, 1998 Edition IEEE Standard for Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Common specifications--Part 3: Media Access Control (MAC) Bridges: Technical and Editorial Corrections

IEEE 802.1w-2001, IEEE Standard for Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Common specifications Part 3: Media Access Control (MAC) Bridges--Amendment 2--Rapid Reconfiguration [Amendment to IEEE Std 802.1D, 1998 Edition (ISO/IEC 15802-3:1998) and IEEE Std 802.1t-2001]

IEEE 802.1e, 1994 Edition, IEEE Standard for Information technology--Telecommunications and information exchange between systems--IEEE standard for local and metropolitan area networks--Common specifications--Part 4: System Load Protocol

IEEE 802.1g, 1998 Edition, Information technology--Telecommunications and information exchange between systems--IEEE standard for local and metropolitan area networks--Common specifications--Part 5: Remote Media Access Control (MAC) bridging

IEEE 802.1q-1998, IEEE standard for local and metropolitan area networks: Virtual Bridged Local Area Networks

P802.1s/D13, Draft IEEE Standard for Local and Metropolitan Area Networks--Amendment 3 to IEEE 802.1q Virtual Bridged Local Area Networks: Multiple Spanning Trees

IEEE 802.1u-2001, (Amendment to IEEE Std 802.1q, 1998 Edition) IEEE Standard for Local and metropolitan area networks--Virtual Bridged Local Area Networks--Amendment 1: Technical and editorial corrections

IEEE 802.1v-2001, (Amendment to IEEE Std 802.1q, 1998 Edition) IEEE Standards Amendment to IEEE 802.1q: IEEE Standards for Local and Metropolitan Area Networks: Virtual Bridged Local Area Networks--Amendment 2: VLAN Classification by Protocol and Port

IEEE 802.1x2001 IEEE Standards for Local and Metropolitan Area Networks: Port-Based Network Access Control

IEEE CSMA/CD Access Method (802.3)

IEEE 802.3-2002® IEEE Standard for Information technology--Telecommunications and information exchange between systems-Local and metropolitan area networks--Specific requirements -Part 3: Carrier

	Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications. Incorporates the IEEE 802.3z Standard for 1000BASE-X Gigabit Ethernet over fiber optic cabling and the IEEE 802.3ab Standard for 1000BASE-T Gigabit Ethernet over copper UTP cabling.
	IEEE 802.3ae-2002 (standard ratified June 2002) Supplement to IEEE 802.3 CSMA/CD Access Method & Physical Layer Specifications - Media Access Control (MAC) Parameters, Physical Layer, and Management Parameters for 10Gb/s Operation
	IEEE 802.3at Amendment: Data Terminal Equipment (DTE) Power Via the Media Dependent Interface (MDI) Enhancements (PoE Plus)
IEEE	Wireless LANs (802.11)
	IEEE Std 802.11, 1999 Edition, IEEE Standard for Information Technology - Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Network - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
	IEEE 802.11a-1999, Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications—Amendment 1: High-speed Physical Layer in the 5 GHz band (An errata is available)
	IEEE 802.11b-1999 Supplement to 802.11-1999,Wireless LAN MAC and PHY specifications: Higher speed Physical Layer (PHY) extension in the 2.4 GHz band
	IEEE 802.11d-2001, Amendment to IEEE 802.11-1999, (ISO/IEC 8802-11) Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements--Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications: Specification for Operation in Additional Regulatory Domains
	IEEE 802.n-2009, Amendment 5 to IEEE 802.11-1999, Enhancements for Higher Throughput
	IEEE 802.11ac, Enhancements for very high throughput WLANs
	IEEE 802.11ax (WiFi 6), Enhancements for High Efficiency WLAN
BICSI	Building Industry Consulting Service International
	Telecommunications Distribution Methods Manual (TDMM) Latest

Edition

Network Design Reference Manual (NDRM) Latest Edition

Outside Plant Design Reference Manual (OSPDRM) – Latest Edition

Telecommunications Cabling Installation Manual (TCIM) Latest Edition

AT&T "Outside Plant Engineering Handbook"

SCTE Society of Cable Television Engineers

All materials and equipment shall be UL listed for the intended application.

1.8 PRE-INSTALLATION SUBMITTALS

1.8.1 Manufacturer's Catalog Data:

Submit five (5) copies of manufacturer's standard descriptive data sheets to the Engineer for review and approval prior to commencing work. Furnish complete data sheets bearing the printed logo or trademark of the manufacturer for each type of product being provided. Mark each copy of the data sheets for the specific product being provided with an identifying mark, arrow, or highlighting. The following items shall be submitted:

1. Conduit and Pull Boxes, Fittings, Related Hardware & Accessories, each type
2. Handholes
3. Cable Runway, Fittings, Related Hardware & Accessories, each type
4. Racks, Related Hardware & Accessories, each type
5. Enclosures and Cabinets, each type
6. Classroom AV System components, equipment and cables
7. Copper Patch Panels, each type
8. Copper Wiring/Patch Blocks, each type
9. Fiber Optic Patch Panels, each type
10. Multi-pair Voice Cable, each type
11. Voice Protector Blocks, each type
12. Voice Surge Protectors, 66 block mounted, each type
13. Fiber Optic Cable, each type
14. Category 6 UTP Cable, each type
15. Cable End Connectors, each type
16. Patch Cables - Copper and Fiber Optic, each type
17. Patch Cord Organizers and Cable Rings, each type
18. Wire Management Devices, each type
19. Communications Outlets (CO), each type
20. Special Purpose Outlets, each type
21. Power Surge Protectors
22. Uninterruptible Power Supplies (UPS), each type
23. Grounding Busbars and Lugs, each type
24. Firestopping Systems, each type
25. Labeling Products, each type
26. All other materials and equipment indicated to be furnished under this section, whether

specifically listed here or not.

1.8.2 Pre-Installation Drawings:

As part of the Structured Cabling System installation, the Contractor shall provide detailed documentation to facilitate system administration, maintenance, and future moves, adds and changes. Drawings shall be provided which incorporate all information in the Contract Drawings, and which fully document any and all Engineer approved changes in materials and methods made by the Contractor. Drawings are not required if no changes to the design are made by the Contractor. Changes to the design shall not be made without the prior written approval of the Engineer. Drawings shall provide the same level of detail as the bid documents. *Electronic files of the Engineer's AutoCAD drawings will not be provided to the Contractor*.

Drawings shall be prepared using AutoCAD Release 14 and shall be furnished in hard-copy format and on industry standard CD or ZIP drive media.

Submit five (5) copies of pre-installation drawings to the Engineer for review and approval prior to commencing work.

1.9 CONTRACTOR'S RECORD DOCUMENTS

The Structured Cabling System Contractor shall maintain a full set of contract documents at the job site at all times, consisting of specifications, drawings, addenda, pre-installation submittals, change orders, and change directives. The record documents shall be updated by the Contractor, in red pen and on a daily basis, to show the following:

1. Final location of all Communications Outlets, Wireless Access Points, ITV Outlets and security cameras.
2. Final conduit routing.
3. Location of all buried utilities encountered during the course of work on this project.
4. Final location of all handholes, pull boxes, and access doors.
5. Any changes to the work authorized by the Owner/Engineer.
6. Any other pertinent information that may be of value to the Owner in operating and maintaining the system.

The Contractor's record documents shall be available for viewing by the Engineer or the Owner at the site at any time and shall be presented and reviewed by the Contractor at each construction progress meeting. The record documents shall be clearly marked "Record Set", shall be kept in a protected location, and shall not be used for general construction purposes. The record documents shall be provided to the Engineer at the close of the project.

The Engineer will provide a full set of Adobe Acrobat *.PDF format drawings to the Contractor. The Contractor shall be required to annotate (redline) the Adobe Acrobat *.PDF format drawings using Adobe Acrobat to reflect all changes recorded in the field as required by the paragraph "CONTRACTOR'S RECORD DOCUMENTS". The Contractor shall provide a copy of the Adobe Acrobat *.PDF files on CD with each set of O&M Manuals and shall provide an additional copy on CD to the Engineer. The Contractor shall also provide 11"x17" laser prints of Adobe Acrobat *.PDF drawings in each O&M Manual.

PART 2 - PRODUCTS

2.1 GENERAL

All materials, equipment, and devices shall be new and unused, of current manufacture and of the highest grade, free from defects.

All products shall be the manufacturer and model or part number specified. Where a model or part number is indicated in error for any reason, the Contractor shall verify the intent of the Engineer prior to providing a proposal and shall provide the product intended by the Engineer. Where a manufacturer has updated or improved a product subsequent to issuance of the bid documents by the Engineer, the Contractor shall provide the updated or improved product at no additional cost to the Owner

Provide new equipment and materials only. Each component shall be the most recent model number, revision, or update offered by the manufacturer at the time of purchase by the Contractor. Newly manufactured containing used or rebuilt parts, remanufactured, rebuilt, reconditioned, used, shopworn, demonstrator or prototype equipment is not acceptable and will be rejected. Each major component of telephone and data systems equipment provided under this contract shall include a certification from the manufacturer stating that the equipment is new and referencing the serial number of the delivered equipment. The Contractor shall track the placement of each major component in the field and shall provide the Owner a list identifying each component by manufacturer, model number, serial number, and installed location (example rack number and rack position).

All materials, equipment and devices shall meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70.

All like items of material or equipment shall be the same product of the same manufacturer, model number and production series.

All materials and equipment shall be a standard catalogued product of a manufacturer regularly engaged in the manufacture of similar products.

2.2 PRODUCT SPECIFICATIONS

See drawings for all product requirements not indicated in these specifications. The Structured Cabling Contractor shall be responsible for providing and installing all components indicated in these specifications and on the drawings, unless specifically indicated to be provided by others. To insure a uniform basis for bidding, and to standardize the Owner's facilities, base all bids on the particular systems, equipment and materials specified which are based on a School District standard.

2.2.1 Structured Cabling System:

Provide all system components as indicated the drawings. To insure a uniform basis for bidding, and to standardize the Owner's facilities, base all bids on the particular systems, equipment and materials specified.

2.2.2 Data and Wireless Systems:

See drawings for data cabling system specifications and equipment mounting requirements.

Data equipment and wireless LAN equipment shall be Owner Furnished Contractor Installed (OFCI) as indicated on the drawings, unless specifically indicated otherwise.

The Structured Cabling System Contractor shall be responsible for notifying the General Contractor when the communications closet (CC) will be ready for equipment installation, and the General Contractor shall notify the Owner's Project Manager in writing not less than 2 months in advance of that date so that the Owner can procure the equipment and make it ready for the installation. The Structured Cabling System Contractor shall be responsible for picking the equipment up at the District Information Technology Department (Technology Services Division), delivering the equipment to the site, mounting the equipment in the CC, connecting power to a rack power strip and patching the equipment to horizontal patch panels in coordination with District IT, all under the Base Bid.

Provide a system of data cabling as indicated on the drawings, to include wiring for Wireless Access Points, security camera systems and network interfaces to other systems as indicated on the drawings.

Wireless Access Points:

The Contractor shall install new WAPs furnished by the Owner at WAP locations indicated on the drawings and selected by the Owner.

The Structured Cabling System Contractor shall provide two new Category 6 cables to each new and WAP location. Direct terminate and test, coil slack in associated mounting box.

2.2.3 Telephone System:

See drawings for voice cabling system specifications.

The Owner will provide handsets and any expansion of the existing telephone system required by the project.

2.2.4 Instructional Television System:

See plans for ITV cabling work.

The ITV system headend is existing. The Owner will provide any modifications to the headend if any are required.

2.2.5 Audio/Visual Systems:

See AV drawings for Multipurpose Room 801 Audio/Visual System by the AV Systems Contractor. The Structured Cabling System Contractor shall provide Category 6 network interfaces as indicated on the drawings.

See drawings for Classroom A/V System requirements. The Contractor shall provide full one year

warranty for commercial grade flat panels.

PART 3 - EXECUTION

3.1 GENERAL

The installation shall be in strict accordance with all applicable codes and standards, the respective manufacturer's written recommendations, and the contract drawings and these specifications.

Workmanship shall be of the highest grade in accordance with the best modern practice and the highest standards of the telecommunications industry.

The installed system shall be neat, clean, and well organized in appearance. Provide working clearances for normal system operation, reconfiguration and repair.

The completed installation shall meet with the approval of the Owner’s Project Manager and the Engineer.

The General Contractor and the Structured Cabling System Contractor shall share full responsibility for protecting all communications outlets, the CER and CC and all structured cabling system components from dust and debris during construction and until final completion of the project. The SCS shall not install racks, wire managers, patch panels, protector blocks, 66 blocks, or dress out and terminate cables until paint, backboards and floors in the CER and CCs are completely finished and those rooms are completely isolated from dust infiltration with plastic sheeting and duct tape. All COs jacks shall be protected by bagging and sealing dust tight at all times after connectivity devices are installed. All system components that, in the sole judgment of the Engineer, are exposed to excessive accumulation of construction dust/debris at any stage of the project shall be removed and replaced with new components at no additional cost to the Owner. Lay-in ceiling grids in the CC shall be installed after conduits and cable trays and cable runways have been installed to allow the ceiling installer to trim around conduits. Lay-in ceiling tiles in these areas should follow completion of cable dressing into racks.

The SCS shall not install racks, wire managers, patch panels, protector blocks, wiring blocks, or dress out and terminate cables until paint, backboards and floors in the CC is completely finished and those rooms are completely isolated from dust infiltration with plastic sheeting and duct tape.

All COs jacks and all ITV connectors shall be protected by bagging and sealing dust tight at all times after connectivity devices are installed or where existing to remain. All system components that, in the sole judgment of the Engineer, are exposed to excessive accumulation of construction dust/debris at any stage of the project shall be removed and replaced with new components at no additional cost to the Owner.

Lay-in ceiling grids in the CC shall be installed after conduits and cable trays and cable runways have been installed to allow the ceiling installer to trim around conduits. Lay-in ceiling tiles in these areas should follow completion of cable dressing into racks.

This is in addition to general isolation of any occupied parts of the school from areas undergoing construction.

3.1.1 Delivery:

Protect materials and equipment from physical or environmental damage during shipping, storage and installation. Equipment and materials shall be received at the site in new condition in original factory sealed cartons, and shall be maintained in new condition throughout the installation process. Damaged or deteriorated equipment and materials will not be acceptable. The Contractor shall be responsible for receiving and storing of all equipment and materials, and shall be responsible for the safety and condition of all materials and equipment, whether stored or installed, until Final Acceptance by the Engineer and the Owner.

3.1.2 Data Equipment:

Provide a system of data cabling as indicated on the drawings. See drawings for data cabling system specifications and equipment mounting requirements.

The Structured Cabling System Contractor shall be responsible for notifying the General Contractor when the communications closet (CC) will be ready for equipment installation, and the General Contractor shall notify the Owner's Project Manager in writing not less than 2 months in advance of that date so that the Owner can procure the equipment and make it ready for the installation. The Structured Cabling System Contractor shall be responsible for picking the equipment up at the District Information Technology Department (Technology Services Division), delivering the equipment to the site, mounting the equipment in the CC, connecting power to a rack power strip and patching the equipment to horizontal patch panels in coordination with District IT, all under the Base Bid.

Power Cords: The Structured Cabling System Contractor shall provide factory made electrical power extension cords as required to extend power connections from all Owner Furnished data equipment to rack power strips. Cords shall route from equipment, up racks attached to standoff brackets as indicated on drawings, and over to rack power strips. The Structured Cabling System Contractor shall also all provide factory made electrical power extension cords as required to extend cords from all rack power strips to a rack mounted UPS or to a wall mount 120VAC power outlet as directed by the Engineer in the field. Power extension cords shall be black, 20 amp capacity (or heavier if required by the equipment served), heavy duty insulation, length as required to make each connection, properly routed and secured at 12 inches on center, with only one cord allowed per connection, and without excess cord storage.

Wireless Access Points:

The Contractor shall install new WAPs furnished by the Owner at WAP locations indicated on the drawings and selected by the Owner.

The Structured Cabling System Contractor shall provide two new Category 6 cables to each new and WAP location. Direct terminate and test, coil slack in associated mounting box.

Coordinate all related work with the Owner's Project Manager and District IT staff.

3.1.3 Telephone System:

See drawings for voice cabling system specifications

The Owner will provide and program handsets and the telephone system.

Provide and install patch cords to interconnect telephone system circuits to horizontal wiring connections as specified herein and as indicated on the drawings.

The Contractor shall identify all voice equipment locations and shall make all required connections of the equipment (phones, faxes, etc.) via line cords in the workspace, cross-connects in the CER, and equipment room voice patch cords in the CC.

The contractor shall take special note of the requirements for this section and shall exercise due diligence in assuring that the work is completed in a timely manner and that all voice systems are fully functional upon occupancy of the school by the Owner.

3.1.4 Television System:

Provide a system of ITV cabling as indicated on the drawings. The installed system shall comply with all standards set forth in F.C.C. Rules, Part 76.

See drawings for specific requirements.

Coordinate all work with the Owner.

3.1.5 Audio/Visual Systems:

See AV drawings for Multipurpose Room 801 Audio/Visual System by the AV Systems Contractor. The Structured Cabling System Contractor shall provide Category 6 network interfaces as indicated on the drawings.

See drawings for Classroom A/V System requirements. The Contractor shall provide full one year warranty for commercial grade flat panels.

3.1.6 Conduit Installation:

All conduit shall be installed by a licensed electrical contractor using tradesmen who are skilled and experienced in the types of conduit installations indicated in the bid documents.

All backbone cabling shall be run continuously in conduit.

All horizontal cabling shall be run continuously in conduit.

1. See “MULTIPURPOSE 801 CONDUIT NOTES” on the drawings for special conduit requirements for continuous conduit to include underground conduit for devices mounted at the south end of Multipurpose Room 801.
2. All Category 6 cabling for special circuits shall be run continuously in conduit.
3. All Category 6 cabling for the IP Security Camera System shall be run continuously in conduit.
4. All Category 6 cabling provided by the SCSC for network connection to the Electronic Access Control, Intrusion Alarm & Lockdown/Panic System shall be run continuously in conduit.

5. All Category 6 cabling provided by the SCSC for network connection to the HVAC DDC Control System shall be run continuously in conduit.
6. All Category 6 cabling provided by the SCSC for network connection to the Lighting Control System shall be run continuously in conduit.
7. All Category 6 cabling provided by the SCSC for network connection to the Electrical Switchgear shall be run continuously in conduit.
8. All horizontal cabling for standard communications outlets and wireless access points shall be installed continuously in conduit.

Do not pull cables in conduits until plastic insulating bushings have been installed. Cables installed in conduits without plastic insulating bushings shall be removed and replaced with new cables.

All conduits shall be run concealed.

Rack conduits and run together wherever possible.

Conduit shall be installed with top-grade workmanship, using factory bends or field bends made with the proper tools. Kinked, dented or otherwise improperly constructed bends will not be accepted. All bends shall have a minimum radius of six times the internal conduit diameter.

All conduit shall be routed parallel and perpendicular to building lines, up high and over piping, ductwork, conduit and other utilities. Conduit in exposed locations shall be run as high as possible, hard against the underside of wall, floor, roof or walkway structures at all times, secured with heavy duty galvanized two-hole supports, and otherwise installed to prevent damage from pulling, hanging, etc.

Install plastic insulating bushings on the ends of all conduits prior to installing cables. Provide conduit end fitting with threaded end and threaded plastic insulating bushing on all EMT conduit ends. Provide UL listed threaded malleable iron insulated grounding bushing on all IMC or RMC conduit ends – add on grounding clamps will not be accepted. Cables installed without plastic insulated bushings or insulated grounding bushings in place shall be removed, the proper bushings installed, then the cables reinstalled, terminated and tested – no exceptions will be made to these requirements.

Firestop all conduit penetrations of all floors and all conduit penetrations of all walls that extend to the underside of the floor or roof deck above. Accomplish firestopping using UL classified systems with fire rating equal to or greater than the fire rating of the floor or wall assembly penetrated. Firestop systems shall be 3M, Nelson or Engineer approved equal. Install in strict accordance with the manufacturer's printed instructions and the conditions of the UL approval for each firestop system used.

All conduit penetrations of walls that do not extend to the underside of the roof deck above and are not fire rated shall be sealed smoketight and acoustically with smoke-sound caulking UL listed for the purpose such as USG Firecode, STI Smoke ‘N’ Sound, or Hilti CP 506.

All buried conduit shall be Schedule 80 electrical grade PVC conduit. All PVC conduit joints shall be cleaned and glued for a watertight connection. Terminate ends of PVC conduit at closets and handholes with end bells.

Seal all underground conduits at building entry points following cable installation to prevent the entry of water into buildings, and to prevent the entry of water or debris into the conduits from the building side. Sealant shall be POLYWATER FST-250 and shall be installed using factory caulking tube, mixing nozzle, damming strips (all included in FST-250KIT1) package.

Buried warning and identification tape: Provide metallic detection tape manufactured specifically for warning and identification of buried utilities. Install tape directly above each buried conduit at depth of 10 to 12 inches below grade for entire length of conduit. Tape shall be detectable by any standard Non-Ferric Metal Detector. Provide tape in rolls, 2 inches minimum width, color orange, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall read "CAUTION BURIED COMMUNICATIONS LINE BELOW". Use permanent code and letter coloring unaffected by moisture and other substances contained in backfill material.

Underground Conduit Validation:

Following installation of underground conduits, perform the following operation for each conduit:

Clean, lubricate and validate each installed conduit for serviceability by running a full size rubber duct swab through the conduit from end to end. Conduits that are obstructed may be cleaned using a wire brush mandrel, then revalidated with the full size rubber duct swab. Conduits that do not allow passage of the full size rubber duct swab shall be replaced.

Pull Tapes: As backbone cabling runs are installed, provide a continuous marked pull tape (Carlon TL3821800 lb. tensile strength) for the full length of the end-to-end cable run with 10 feet of slack at each end pulled in alongside cabling. Bundle slack neatly at each end and tie off to conduit support strut at each end. Provide continuous factory uncut lengths of pull tape from end-to-end - under no circumstances shall pull partial length section of pull tape be tied together.

Spare Conduits: For conduits that are indicated as spare, install a continuous marked pull tape (Carlon TL382 1800 lb. tensile strength) for the full length of the end-to-end conduit run with 10 feet of slack at each end, tie each end of the tape to a blank duct plug with rope tie tab, push slack tape back into conduit, and install a duct plug in each conduit end for a watertight seal.

3.1.7 Cabling Installation:

All backbone cabling shall be run continuously in conduit.

All horizontal cabling shall be run continuously in conduit.

1. See “MULTIPURPOSE 801 CONDUIT NOTES” on the drawings for special conduit requirements for continuous conduit to include underground conduit for devices mounted at the south end of Multipurpose Room 801.
2. All Category 6 cabling for special circuits shall be run continuously in conduit.
3. All Category 6 cabling for the IP Security Camera System shall be run continuously in conduit.
4. All Category 6 cabling provided by the SCSC for network connection to the Electronic Access Control, Intrusion Alarm & Lockdown/Panic System shall be run continuously in conduit.
5. All Category 6 cabling provided by the SCSC for network connection to the HVAC DDC

Control System shall be run continuously in conduit.

6. All Category 6 cabling provided by the SCSC for network connection to the Lighting Control System shall be run continuously in conduit.
7. All Category 6 cabling provided by the SCSC for network connection to the Electrical Switchgear shall be run continuously in conduit.
8. All horizontal cabling for standard communications outlets and wireless access points shall be installed continuously in conduit.

Do not pull cables in conduits until plastic insulating bushings have been installed. Cables installed in conduits without plastic insulating bushings shall be removed and replaced with new cables. Rack conduits and run together wherever possible.

Provide wire management devices on backboards and racks as indicated and as required to facilitate organized routing of cables and patch cords. Bundle cables together behind racks and fan out to points of termination. The finished installation shall meet the approval of the Engineer for overall quality and neatness of appearance.

The Contractor, in providing a bid for the system in accordance with the contract documents, agrees to install all cabling in the conduit and wireway paths indicated in the contract documents, or to provide larger conduit and wireway paths as he deems necessary, at no additional cost to the Owner. The Contractor shall be fully responsible for any and all damage to cabling that may occur during the installation and shall replace any damaged cabling with new cabling of the type specified for the application.

Firestop all cable penetrations of all floors and all walls that extend to the underside of the floor or roof deck above. Accomplish firestopping using UL classified systems with fire rating equal to or greater than the fire rating of the floor or wall assembly penetrated. Firestop systems shall be 3M, Nelson or Engineer approved equal. Install in strict accordance with the manufacturer's printed instructions and the conditions of the UL approval for each firestop system used.

All cable penetrations of walls that do not extend to the underside of the roof deck above and are not fire rated shall be sealed smoketight and acoustically with smoke-sound caulking UL listed for the purpose such as USG Firecode, STI Smoke ‘N’ Sound, or Hilti CP.

3.1.8 Identification and Labeling:

The Structured Cabling System Contractor shall purchase and use professional labeling software and labeling products to generate all labels for this project, with the exception of engraved plastic tags and laminated paper tags, which shall be fabricated as indicated on the drawings, and elsewhere as indicated below. The Contractor shall determine the proper labeling product for each application and include a list of each product and application with the Pre-Installation Submittals.

All labels shall be produced using a laser printer and shall be clear and easily readable. Minimum text size shall be 12 point. Text font shall be ARIAL or ARIAL NARROW. Handwritten labels are not acceptable.

Label each horizontal cable and backbone cable using self-adhesive self-laminating polyester wrap-around labels with laser printed text as follows:

Label each Horizontal Category 6 cable at each end. Label text shall be based on the nomenclature indicated on the drawings.

Label each Fiber Optic Backbone, Voice Backbone Cable and ITV Backbone Cable at each end. Label text shall be based on the nomenclature indicated on the drawings.

Label each Communications Outlet using non-adhesive card labels with laser printed text. Insert labels under outlet manufacturer's plastic label covers centered and straight. Label text shall be based on the Communication Outlet Identification Nomenclature and labeling details indicated on the drawings.

Label each Category 6 Horizontal Patch Panel port using non-adhesive labels with laser printed text inserted into the plastic covered label holders supplied by the patch panel manufacturer centered and straight. Label text for each patch panel port shall be based on the Horizontal Patch Panel Labeling Nomenclature and labeling details indicated on the drawings.

Label each Backbone Fiber Optic Cable Drawer with 1" high bold text printed on clear self-adhesive paper and attached to the reverse side of drawer manufacturer's paper label. Label text shall be based on the 'Fiber Optic Backbone Cable Nomenclature' indicated on the drawings to indicate source (CER) and each destination (respective CC).

Label each Communications Panel, Rack, Enclosure/Cabinet, Voice Protector Block, Voice Patch Panel and other devices as indicated on the drawings.

Label each Main Conduit at each end with ½" high bold text printed on heavy stock paper and secured to conduit with clear self-adhesive sheets covering the label and extending out beyond the label 1" all around for adhesion to the conduit. Label text shall be based on source (CER) and each destination (respective CC).

Provide data sheets describing all proposed labeling products with Pre-installation Submittals.

3.2 CABLE TESTING

3.2.1 General:

Prior to installation of cabling, visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport. Return visibly damages goods to the supplier and replace with new.

If post-manufacture performance data has been supplied by the manufacturer of cables or connecting hardware, copies of such data are to be kept for inclusion in the Documentation and made available to the Owner upon request.

After cabling installation and labeling is complete, but prior to the installation of patch cords, the Contractor shall test all cables. *As part of cable test procedures verify all labeling and correct all inaccurate labeling*.

The Contractor's RCDD shall be in responsible charge of all cable testing procedures and shall provide an original signed letter in each project Operation & Maintenance (O&M) manual certifying that all cables have been tested in compliance with the contract documents and have

met or exceeded the requirements stated therein.

Tests shall be performed in strict accordance with the test instrument manufacturer's printed instructions.

One hundred percent of all cables shall be tested.

Technicians performing testing shall be thoroughly trained in the use of the test instruments employed. Factory certification of technicians is mandatory. The Contractor shall provide evidence of training and copies of certificates to the Engineer.

The Contractor is responsible for supplying all test equipment and related materials required to test the entire Structured Cabling System. Test instruments shall be calibrated and traceable to the National Institute of Standards (NIST). Test instruments shall have been recently calibrated. The Contractor shall provide evidence of test instrument calibration if requested by the Engineer.

The requirement for this project is full compliance/zero tolerance. Cables that do not comply with the stated standards shall be removed and replaced with new. Partial use of cables by claiming good pairs or strands and abandoning others is not allowable. Defective cables shall be removed and replaced with new.

Notify the Owner in writing not less than five days prior to commencing cable testing. The Owner may elect to be present for and witness cable testing.

The Contractor shall be required to retest installed cables in the Owner's presence to verify the Contractor's test documentation. The percentage of cables to be retested shall be determined by the Owner based on compliance of the installation with the contract documents, quality of workmanship, and results of initial cable tests. Retesting shall be performed as required until all cables, in the judgment of the Owner, comply with the requirements of the contract documents.

3.2.2 Cable Test Results:

All cable test results shall be provided as part of the project Installation and Maintenance (O&M) Manuals.

3.2.3 Category 6 UTP Cable Testing:

Testers:

Each Category 6 cable shall be tested with Fluke Networks DSP-4300 Digital Cable Analyzers utilizing Fluke Networks DSP-LIA101 Universal Permanent Link Interface Adapters and the appropriate Personality Modules. In addition, each tester shall be calibrated prior to commencing testing for this project using a Fluke Networks DSP-PLCAL Universal Permanent Link Calibration Kit and Fluke Networks ‘Cable Manager’ software.

Prior to testing, electronically update tester software using the tester manufacturer’s ‘Cable Manager’ software update utility. Update to the software version current at time tests are performed. Under no circumstances shall a tester with outdated software be used.

General:

Testing shall be of the Permanent Link. However, the Structured Cabling System Contractor and the Structured Cabling System Manufacturer shall warrant performance based on Channel performance and provide shall patch cords that meet Channel performance requirements.

All test results shall be maintained in the native file format of the tester manufacturer's 'Cable Manager' software. Under no circumstances shall be data be modified by other software, edited in any manner, or exported to a database, spreadsheet, work processor program or any other type of program that would allow access to the data for modification. Hardcopy printouts of test reports in Summary Format shall be generated directly from the 'Cable Manager' software. Detailed test results in Text Format shall be provided to the Owner in native 'Cable Manager' data format on a CD. In addition, detailed test results in Text Format shall be provided to the Owner in Adobe Acrobat *.PDF format on a CD. CDs shall be included in the project Operation and Maintenance (O&M) manuals.

Record all test conditions and setup parameters and include in a typed discussion to be provided with test documentation.

Verify correct labeling of patch panels and communications outlets prior to and during testing. If any label is found to be in error, correct before proceeding with testing. Circuit Identification (cable I.D.) in cable test reports shall be exactly the same as the outlet labeling based on the nomenclature indicated on the drawings.

Testing:

After installation, termination and labeling of the Category 6 UTP cable is complete and approved by the Structured Cabling System Contractor's RCDD, test each cable in accordance with all applicable TIA/EIA standards for UTP Category 6, and complete all operations required for a Panduit Certified Cabling System and 20 year Panduit System Warranty.

Prior to testing, electronically update tester software using the tester manufacturer's 'Cable Manager' software update utility. Update to the software version current at time tests are performed. Under no circumstances shall a tester with outdated software be used.

Test each cable to verify compliance with TIA/EIA specifications for Category 6 UTP, Permanent Link configuration, Level III accuracy, with no allowable deviation. Test at the full range of frequencies indicated by TIA/EIA up to and including 250 MHz.

Test using the tester manufacturer's standard TIA/EIA Category 6 Autotest. Under no circumstances shall a Custom Cable Autotest designed by the tester manufacturer specifically for a given cable manufacturer or structured cabling system manufacturer be used to test cables. All tests and testing procedures for this project shall be strictly based on TIA/EIA standards. Enter the proper Nominal Velocity of Propagation (NVP) for the specific cable(s) installed. Test for the following parameters:

1. Wire Map – verify no shorts, opens, miswires, split, reversed or crossed pairs, and end-to-end connectivity is achieved.
2. Cable Length
3. Insertion Loss (attenuation)
4. NEXT Loss

5. PSNEXT Loss
6. ELFEXT Loss
7. PSELFEXT Loss
8. Return Loss
9. ACR
10. PSACR
11. Propagation Delay
12. Delay Skew

Documentation:

Test documentation for Category 6 cabling shall include the following:

1. An introductory discussion documenting each test instrument used, the Autotest routine used on each test instrument, qualifications of operators, test conditions, setup parameters, and any other pertinent information.

2. A summary hardcopy printout for all cables using the tester manufacturer's standard 'Cable Manager' software to produce an "AutoTest Summary" report. The summary report shall include Project Name, Circuit I.D., Result (pass or fail) and the cable length. The report shall be printed directly out of the 'Cable Manager' program in native format and in *.PDF format – under no circumstances shall the data be exported to any other type of program at any time.

3. A full-page text only detailed test result for each cable using the tester manufacturer's standard 'Cable Manager' software to produce an "AutoTest Report". Each report shall be printed directly out of the 'Cable Manager' program in native format and in *.PDF format - under no circumstances shall the data be exported to any other type of program at any time. Each report shall include the following components:

    - Tester manufacturer, model, serial number, hardware version, and software version
    - Project Name
    - Operator Name
    - Cable manufacturer, cable part number/type and NVP
    - Circuit I.D.
    - Autotest specification used (must be standard TIA Category 6 autotest)
    - Identification of the tester interface used
    - Overall pass/fail indication
    - Date of Test
    - Wire Map
    - Cable Length in feet
    - Insertion Loss (attenuation)
    - NEXT Loss*
    - PSNEXT Loss*
    - ELFEXT Loss*
    - PSELFEXT Loss*
    - Return Loss*
    - ACR*
    - PSACR*
    - Propagation Delay

- Delay Skew

* Measure from both ends of each cable

5. A PASS or FAIL result for each parameter shall be determined by comparing the measured values with the specified test limits for that parameter. The test result for each parameter shall be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer shall provide documentation as an aid to interpret results marked with asterisks.

   Each individual test that fails the relevant performance specifications shall be marked as FAIL or FAIL*. Any FAIL or FAIL* result yields a FAIL rating for the link-under-test. In order to achieve an overall PASS rating, the results for each individual test parameter must yield a PASS or PASS* result.

7. Cable identities (Circuit IDs) shall be based on the labeling nomenclature described on the drawings.

8. Transfer of Software to Owner: Provide tester manufacturer's 'Cable Manager' software, latest version, to the Owner for the Owner's use in viewing and managing test results.

9. Provide all Category 6 cable test documentation in the project O&M Manuals.

Category 6 Cable Performance Criteria:

If the test results for a given cable or cables, in the sole judgment of the Engineer, fail to confirm acceptable performance, the Contractor shall reconnectorize or replace with new the affected cables as required to achieve specified performance levels as demonstrated by retesting.

3.2.4 Fiber Optic Cable Testing:

General:

Clean all fiber optic connectors, sleeves and test cords prior to testing. Follow all other recommendations of the test instrument manufacturer for cable and instrument preparation.

Record all test conditions and setup parameters and include in a typed discussion to be provided with test documentation.

On-the-Reel-Testing:

Before commencing the installation and with the cable on the reel, test at least one fiber strand on each cable reel to verify that the cable is undamaged. Record and print test results for future reference.

Post-Installation Testing:

After installation, termination and labeling of fiber optic cable is complete and approved by the Structured Cabling System Contractor's RCDD, test each strand of fiber to verify that the installed cable meets the performance requirements described below. Test in accordance with

TIA/EIA-568-B with the additional (and more stringent) requirements following:

Test fiber using the Fluke Networks DSP-4300 Digital Cable Analyzers specified for Category 6 UTP cable in combination with Fluke Networks DSP-FTA440S Gigabit Multimode Fiber Test Adapters. The DSP-FTA440S Fiber Test Adapter uses a VCSEL source at 850nm and a FP Laser light source at 1310nm for testing multimode fiber running Gigabit Ethernet. Test as follows:

1. Test two fiber links at the two specified wavelengths simultaneously. Perform bi-directional testing on both strands of the fibers-under-test and save results in one record.
2. Measure length for each cable link.
3. Measure attenuation for each cable link.
4. Utilize Fluke Networks 'Cable Manager' software to store test results and to generate reports.

Test results shall include all test parameters including length and attenuation at each wavelength for each fiber link (terminated strand). Attenuation shall be the worst case result yielded from bi-directional testing. All test results shall be maintained in the native file format of the tester manufacturer's 'Cable Manager' software. Under no circumstances shall be data be modified by other software, edited in any manner, or exported to a database, spreadsheet, work processor program or any other type of program that would allow access to the data for modification. Detailed test results in Text Format shall be provided to the Owner in native 'Cable Manager' data format on a CD. In addition, detailed test results in Text Format shall be provided to the Owner in Adobe Acrobat *.PDF format on a CD. CDs shall be included in the project Operation and Maintenance (O&M) manuals.

Insert all fiber optic cable test documentation in the project O&M manuals.

Fiber Optic Cable Performance Requirements:

Each link of the installed fiber optic cabling, with mated connectors at each end, shall have a total attenuation (in db) less than or equal to the manufacturers' performance specifications for the cable and connectors called for in the contract documents, with the cable attenuation adjusted for the installed length, and with an allowable deviation of +1.0 db. If the test results for a given strand or strands, in the sole judgment of the Engineer, indicate excessive attenuation based on these requirements, the Contractor shall repolish, reconnectorize, or replace the affected cables as required to achieve the specified performance levels as demonstrated by retesting.

The Contractor should note that these specifications are more stringent than the TIA/EIA-568-B criteria for either horizontal or backbone fiber lengths in terms of allowable link attenuation, and plan the installation accordingly.

3.2.5 Multi-pair Telephone Cable Testing:

Test each conductor for end-to-end continuity. Test each cable for correct termination on a pin-by-pin basis. Verify no shorts, opens, miswires, split, reversed or crossed pairs. Document results of testing and submit to Engineer for review and approval. The test log shall include cable identifiers as indicated on the drawings, the test date, the initials of the technician who tested the cable, and the test results.

Insert all multi-pair telephone cable test documentation in the project O&M manual.

3.2.6 Coaxial ITV Cable Testing:

Test each cable for continuity and attenuation. Check each cable for correct termination – remake all connectors that are not properly terminated. Verify proper grounding at service entrance and at all surge suppression devices.

Provide services of the lead ITV technician to tune the ITV system as indicated on the drawings, and complete the "ITV Outlet Tuning Log Form". Contact the District CCTV Technician prior to commencing tuning and coordinate all tuning activities. Provide copy of log, signed by the technician who performed the tests, to the Engineer following testing and include a copy in each O&M Manual

3.3 Patch Cord Installation:

Prior to Equipment Verification, the contractor shall install patch cords in a neat and workmanlike manner using the wire management devices indicated on the drawings. The contractor shall work side by side with the School's Technology Specialist throughout the entire patch cord installation for purposes of coordination and training.

Prior to installation of patch cords, the contractor shall account for all patch cords in the presence of the Owner's Project Manager and the School's Technology Specialist, and shall present to the Project Manager a typed inventory of the patch cords broken down by type and length as scheduled on the drawings. The Owner's Project Manager will verify patch cord types, quantities, and lengths and will sign the inventory indicating that the contractor has delivered patch cords to the job site in accordance with the requirements of the contract documents. The contractor shall provide a copy of the inventory, signed by the Owner's Project Manager, in the O&M Manuals.

The signature of the Owner's Project Manager does not indicate acceptance of ownership of the patch cords by the Owner. Ownership of patch cords shall be transferred to the Owner at the same time as the project as a whole.

Following verification of patch cords types, quantities and lengths by the Owner's Project Manager, the contractor shall complete the patch cord installations as follows:

3.3.1 Data Copper Patch Cords – CC:

Install data patch cords connecting data equipment to horizontal patch panels. Horizontal wiring connections to be made active shall be as directed by the Owner's Project Manager and the School's Technology Specialist in the field.

If requested by the Owner Provide a typed cross-reference list in Microsoft Excel spreadsheet format identifying data equipment ports and corresponding horizontal wiring connections – place hardcopy and CD of spreadsheet in three ring binder and mount binder on the backboard adjacent to the racks. Provide additional hardcopy and CD in O&M Manuals. Email copy of Excel Spreadsheet to the Engineer and the Owner's Project Manager.

Patch cords shall be neatly routed and bundled with black velcro at 6 inches on center in wire management devices from connection to connection. Patch cord lengths shall be selected by the Contractor from the stock supplied under the project to provide a neat installation in the racks and

wire management systems without excess length. Note - Bundle data patch cords together – do not mix data patch cord bundles with voice patch cord bundles or fiber optic patch cord bundles. The entire installation shall require the site approval of the Engineer.

3.3.2 Analog Voice Patch Cords – CC:

Install voice patch cords connecting telephone system station circuits from voice backbone distribution patch panels to horizontal patch panels. Horizontal wiring connections to be made active shall be as directed by the Owner's Project Manager and the School's Technology Specialist in the field.

If requested by the Owner Provide a typed cross-reference list in Microsoft Excel spreadsheet format identifying telephone system station circuits to voice backbone distribution patch panel ports to horizontal wiring connections – place hardcopy and CD of spreadsheet in three ring binder and mount binder on the backboard adjacent to the racks. Provide additional hardcopy and CD in O&M Manuals. Email copy of Excel Spreadsheet to the Engineer and the Owner's Project Manager.

Patch cords shall be neatly routed and bundled with black velcro at 6 inches on center in wire management devices from connection to connection. Patch cord lengths shall be selected by the Contractor from the stock supplied under the project to provide a neat installation in the racks and wire management systems without excess length. Note - Bundle voice patch cords together – do not mix voice patch cord bundles with data patch cord bundles or fiber optic patch cord bundles. The entire installation shall require the site approval of the Engineer.

3.3.3 Fiber Patch Cords – CER and CC:

Install fiber optic patch cords to connect all data equipment fiber optic ports as directed by the Owner's Project Manager in the field. Patch cords shall be neatly routed and bundled with black velcro at 3 inches on center in wire management devices from connection to connection. Patch cord lengths shall be selected by the Contractor from the stock supplied under the project to provide a neat installation in the racks and wire management systems without excess length. Note - Bundle fiber optic patch cords together – do not mix fiber optic patch cord bundles with data patch cord bundles or voice patch cord bundles. The entire installation shall require the site approval of the Engineer.

3.3.4 Workstation Patch Cords

The Contractor shall, in coordination with the Owner's Project Manager and the School's Technology Specialist, install workstation data patch cords in the locations designated by the Technology Specialist as described above for connection of equipment room data patch cords to horizontal wiring connections. In addition, the Contractor shall work side by side with the Telephone System Provider to install telephone line cords as telephone instruments are set.

3.4 EQUIPMENT VERIFICATION

After installation of patch cords and before System Startup, the Contractor shall assist the Owner to power-up all data equipment and verify proper operation. The Contractor shall coordinate with the Owner to verify all cable interfaces are working and operational with the equipment. The contractor shall make any cabling system changes and additions as necessary and/or provide

patch cables as required to complete the installation.

3.5 FINAL CHECKOUT

After System Startup and before the First Day of operation following System Startup, the Contractor shall perform a Final Checkout of all systems to verify that each is ready for use by Owner personnel. The Contractor shall utilize a Final Checklist to fully document Final Checkout. Provide a copy of the Final Checklist to the Engineer at the Final Inspection.

3.6 FIRST DAY of OWNER OPERATION

The Contractor shall have a senior technician present at the site for the first full 8 hour day of operation following the Final Checkout to train/assist Owner personnel and to verify/fine tune system operation. The senior technician shall make follow-up visits as required to bring the system into full operating condition to the satisfaction of the Owner's Project Manager and the Engineer.

3.7 FINAL CLEANUP

The General Contractor and the Structured Cabling System Contractor shall share full responsibility for protecting all communications outlets, the CC and all structured cabling system components from dust and debris during construction and until final completion of the project. The SCS shall not install racks, wire managers, patch panels, protector blocks, 66 blocks, or dress out and terminate cables until paint, backboards and floors in the CC are completely finished and those rooms are completely isolated from dust infiltration with plastic sheeting and duct tape. All COs jacks shall be protected by bagging and sealing dust tight at all times after connectivity devices are installed. All system components that, in the sole judgment of the Engineer, are exposed to excessive accumulation of construction dust/debris at any stage of the project shall be removed and replaced with new components at no additional cost to the Owner. Lay-in ceiling grids in the CC shall be installed after conduits and cable trays and cable runways have been installed to allow the ceiling installer to trim around conduits. Lay-in ceiling tiles in these areas should follow completion of cable dressing into racks.

Prior to the Substantial Completion Inspection, perform final cleanup of all work and all areas in which work was performed. All work areas shall be left vacuum clean. All raceway, faceplates, jack assemblies, racks, panels, data equipment, and the like shall be thoroughly wiped down to remove small amounts of dust accumulated during the course of the project. Jacks, patch panels, wiring blocks and data, voice and data equipment shall be cleaned with a high powered vacuum cleaner to completed remove internal dust. All painted surfaces such as backboards shall be touched up with paint to remove scuff marks, pencil marks, scratches, etc. All factory surfaces shall be touched with matching paint.

3.8 CLOSE-OUT DOCUMENTATION

3.8.1 Operation & Maintenance Manuals:

Provide O&M Manuals as required by the architectural specifications and as follows.

The O&M Manuals shall contain sufficient information to permit Owner personnel to operate the system with or without assistance from the Contractor.

The Contractor shall provide O&M Manuals covering all equipment and materials furnished under this contract. The O&M Manuals shall contain all information necessary for the operation, maintenance, parts procurement, and parts replacement for the structured cabling system. The information shall include detailed documentation for firmware configuration.

Quantity: Three (3).

Format: *Provide 8-1/2" x 11" loose-leaf 3-ring binders with clear vinyl overlay designed to receive identification inserts. 3-ring binders shall be heavy- duty D-Ring type, over-sized to allow the insertion of additional system documentation in the future.*

Project Identification: Furnish project identification *inserted under the clear vinyl overlay on the front cover and the back spline as follows:*

Operating & Maintenance Manual
Project Name
Structured Cabling System Contractor

Project Information: On the front page, *enclosed in a 3-ring clear plastic sheet protector*, provide the following information:

Project Name
Structured Cabling System Contractor Name
Structured Cabling System Manufacturer Name
Electrical Contractor Name
Contractor's Project Manager
Contact list with name, address, contact person, phone number, and fax number for the each of the following:

Structured Cabling System Contractor
Structured Cabling System Manufacturer
Electrical Contractor

Index: On the second page, *enclosed in a 3-ring clear plastic sheet protector*, provide an index indicating the following section numbers and titles.

Sections: All sections shall be separated with an appropriate tabbed section divider with the appropriate number and title (typed) as follows:

Section 1 – Cuts Sheets:

Manufacturer's original data/cut sheets for each system component.

Section 2 – Data Equipment List:

Typed list of each item of data equipment (including Owner furnished data equipment) with brief description, serial number, and part number. Note where each item of equipment is installed

(CER/CC number, rack number and mounting position in rack). *Enclose in a 3-ring clear plastic sheet protector.*

Section 3 – Factory Manuals:

Manufacturer's printed Installation and Operating Manuals for each item of equipment provided by the Contractor. *Provide 3-ring zip-lock pockets for each manual that is not factory 3-ring hole punched*. Do not include manuals loose or inserted in binder pockets.

Section 4 - Warranties:

- Copy of Structured Cabling System Contractor and Manufacturer's 20 year warranty. *Enclose in a 3-ring clear plastic sheet protector.*
- Copy of Manufacturer's printed warranty for each item of equipment. *Enclose in a 3-ring clear plastic sheet protector.*

Section 5 - Transmittal of Loose Items:

Copy of transmittal to the school of all loose items such as patch cords, spare surge protectors, spare parts, etc. signed-off by the Owner. *Enclose in a 3-ring clear plastic sheet protector.*

Section 6 - Documentation of Training:

Documentation of training signed-off by the School's Technology Specialist or Principal. *Enclose in a 3-ring clear plastic sheet protector.*

Section 7 - Cable Test Results:

Part 1 – RCDD Certification:

Provide written Certification of Contractor's RCDD, stating that all fiber optic, Category 6 and multi-pair telephone cables have been tested in compliance with the contract documents and have met or exceeded the requirements stated therein. *Enclose in a 3-ring clear plastic sheet protector.*

Part 2 – Executive Summary:

Provide Hardcopy Summary Report of test results in the following divisions:

- Category 6 Cabling – Generate report directly from Fluke Networks 'Cable Manager' software.
- Fiber optic horizontal cabling – Generate report directly

from Fluke Networks 'Cable Manager' software.

- Fiber optic backbone cabling – Generate report directly from Fluke Networks 'Cable Manager' software.
- Multi-pair telephone cabling.
- ITV coaxial cabling.

Enclose each report in a 3-ring clear plastic sheet protector.

Part 3 – Fiber Optic Cables:

Provide detailed printed test results for all fiber optic cables. *Test results shall be printed on a laser printer. Enclose hardcopy in a 3-ring clear plastic sheet protector.*

Part 4 – Category 6 Cables:

Provide CD with Category 6 cable text only test results in native Fluke Networks 'Cable Manager' software *.FCM format and in Adobe Acrobat *.PDF format. *Place CD in 3-ring clear plastic CD jacket.*

Part 5 – Fiber Optic Backbone Cables:

Provide CD with fiber optic backbone cable test results in native Fluke Networks 'Cable Manager' software *.FCM format and in Adobe Acrobat *.PDF format. *Place CD in 3-ring clear plastic CD jacket.*

Part 6 – Multi-pair Telephone Cables:

Provide Printed test results for all multi-pair telephone cables. *Test results shall be printed on a laser printer. Enclose hardcopy in a 3-ring clear plastic sheet protector.*

Part 7 – ITV System Cables:

Provide completed 'ITV Outlet Tuning Log Form' as indicated on drawings. *Test results shall be printed on a laser printer. Enclose hardcopy in a 3-ring clear plastic sheet protector.*

Section 8 - Patch Cord Spreadsheet (voice and data):

Provide Hardcopy and CD of Excel Spreadsheet file. *Enclose hardcopy in a 3-ring clear plastic sheet protector. Place CD in 3-ring clear plastic CD jacket.*

Section 9 – Annotated Adobe Acrobat *.PDF As-Built Drawings.

Provide 11"x17" hardcopy laser prints and CD of *.PDF files.

Enclose hardcopy in a 3-ring clear plastic sheet protector. Place CD in 3-ring clear plastic CD jacket.

3.8.2 As-Built AutoCAD Drawings:

Provide the same AutoCAD drawings as required under paragraph "Pre-Installation AutoCAD Drawings". Modify and correct to accurately reflect the finished installation. Provide five (5) hard-copies and two (2) sets of electronic media.

Submit As-Built AutoCAD Drawings to the Engineer at the Substantial Completion Inspection. Provide transmittal letter addressed to the Engineer indicating that the Contractor is providing five (5) hard-copies and two (2) sets of electronic media of the As-Built AutoCAD Drawings.

3.8.3 Red-Line Record Documents:

Refer to paragraph "CONTRACTOR'S RECORD DOCUMENTS". Provide Record Documents, updated in red pen, to accurately reflect the finished installation.

Submit Red-Line Record Documents over to the Engineer at the Substantial Completion Inspection. Provide transmittal letter addressed to the Engineer indicating that the Contractor is providing one (1) set of Red-Line Record Documents.

3.8.4 Annotated Adobe *.PDF A-Built Drawings:

The Engineer will provide a full set of Adobe Acrobat *.PDF format As-Built Drawings to the Contractor. The Contractor shall be required to annotate (redline) the *.PDF format drawings using Adobe Acrobat to reflect all changes recorded in the field as required by the paragraph "CONTRACTOR'S RECORD DOCUMENTS". The Contractor shall provide a copy of the *.PDF files on CD with each set of O&M Manuals and shall provide an additional copy on CD to the Engineer. The Contractor shall also provide 11”x17” hardcopy laser prints of *.PDF drawings in each O&M Manual.

3.9 SUBSTANTIAL COMPLETION

Complete Final Checkout of system operation, Final Checklist, Cable Test Results, O&M Manuals and Record Documents prior to Substantial Completion. The Contractor's project manager and project senior technician shall be present for the Substantial Completion Inspection.

3.10 OWNER PERSONNEL TRAINING

Owner personnel training shall be provided for the Structured Cabling System. The cost of training shall be included in the cost of the system. Two copies of all manuals and training material shall be supplied to the Owner’s Project Manager at no additional cost.

The Owner’s Project Manager shall be notified prior to each training session and may participate in the training at his or her discretion.

All instruction shall be presented in an organized and professional manner by personnel who are thoroughly familiar with the installation and who certified by the manufacturer of the specific system and/or equipment for which they are providing training.

The Structured Cabling System Contractor shall provide documentation of all training (including names of personnel present at each training session) to the Engineer at the Final Completion Inspection. The documentation shall be signed-off by the Owner. The documentation shall be three-hole punched and ready for insertion in the O&M manuals.

3.10.1 Structured Cabling System Training:

Subsequent to Substantial Completion but prior to Final Completion, the Contractor shall provide on-site training to Owner personnel on the operational use of the Structured Cabling System and the all related equipment.

The Structured Cabling System Contractor shall schedule a time to provide not less than two (2) hours of formal training to school personnel on the Structured Cabling System. The Structured Cabling System Contractor shall provide an additional two (2) hours of follow-up training on the system when requested by the Owner at any time during the warranty period.

Structured Cabling System training shall include a "walk-through" of the systems to identify and locate closets, panels, and important system components, a discussion of overall system concepts and configuration, specific instruction in labeling and patch cord move/changes, a review of the as-built drawings, a review of the system verification and acceptance documentation, and guidelines for basic trouble-shooting and operation of the Structured Cabling System and all related equipment.

3.11 FINAL COMPLETION

Following completion of punch list items generated by the Engineer following the Substantial Completion Inspection, the Contractor shall notify the Engineer in writing, stating that all punch list items have been completed.

3.12 WARRANTY

The Structured Cabling System Contractor warrants all work performed by him directly and all work performed for him by others for a period of three years. Any work, material or equipment which during the warranty period is, in the opinion of the Engineer or the Owner’s Project Manager, defective or inferior and not in accordance with the contract documents, shall be made good at no additional cost to the Owner, including any other work which may have been damaged because of such deficiencies. The Contractor shall be the contact person and the person responsible for coordinating all warranty work for the Owner.

When equipment cannot be repaired at the site, the Contractor shall be completely and solely responsible for the coordination and completion of equipment repairs, including pickup at the project site, transportation and shipping costs to and from the repair site, and reinstallation and reintegration into the system. Equal or better loaner equipment shall be provided and installed by the Contractor any time equipment cannot be repaired at the site, so that the system is maintained in continuous working order as before the equipment failed.

3.12.1 Special Warranty – Structured Cabling System:

All materials, equipment and workmanship incorporated in the work shall be guaranteed by the

Structured Cabling System Contractor and the Structured Cabling System Manufacturer for a period of 20 years from the date of Final Completion of the project and Final Acceptance by the Owner. See paragraph 1.4.1 Special Warranty - Structured Cabling System for detailed requirements. The Structured Cabling System Contractor shall provide all necessary documentation required by the Structured Cabling System Manufacturer to properly register the system with the manufacturer for warranty purposes. The Structured Cabling System Manufacturer shall issue certificates of warranty signed by a permanent employee of the Structured Cabling System Manufacturer who is authorized by the senior officers of the company to certify Category 6 cabling systems. Original certificates of warranty shall be provided to the Owner, with copies to the Engineer.

END OF SECTION 17000

SECTION 17050 – IP SECURITY CAMERA SYSTEM

1.0 PART 1 – GENERAL

1.1 SCOPE

1.1.1 This specification delineates the requirements for a complete IP Camera Security System as specified herein and as indicated on the drawings.

1.1.2 The scope is to provide a complete and warranted system ready for operation. The installation shall include all accessories and appurtenances required to provide a complete and fully operational system. Any materials not specifically mentioned in these specifications or not shown on the drawings but required for a finished installation shall be furnished and installed at no additional cost to the Owner.

1.2 STRUCTURED CABLING SYSTEM CONTRACTOR

See Section 17000 - Communications Structured Cabling System.

1.2.1 The SCSC shall provide, terminate and test the Category 6 horizontal cabling serving the security cameras. The SCSC shall provide slack cable length at each camera as directed by the IP Security Camera System Integrator. The SCSC shall also provide horizontal patch panels and patch cables in the communications closet, along with labeling and all other associated work.

1.2.2 The SCSC shall closely coordinate all work with the General Contractor, IP Security Camera System Integrator, and Electrical Contractor.

1.3 IP SECURITY CAMERA SYSTEM INTEGRATOR

1.3.1 The IP Security Camera System Integrator selected by and currently under multi-year contract with the Owner shall provide work as specifically indicated in this specification and on the drawings and as described in the IP Security Camera System Integrator Allowance cost and scope of work statement. Refer to Allowances in the front end specifications. The Allowance cost and scope of work statement will be issued in an Addendum prior to bids. The General Contractor shall include the cost of the allowance in his Base Bid, and the IP Security Camera System Integrator shall be a subcontractor to the General Contractor.

1.3.2 The IP Security Camera System Integrator shall provide all security cameras and security camera mounts and shall be responsible for coordinating final security cameras locations and optimum views. The IP Security Camera System Integrator shall provide full integration of all security cameras into the district March Networks Video Management System (VMS).

1.3.3 The IP Security Camera System Integrator shall be fully certified by and an authorized dealer for the March Network VMS and all security camera manufacturers listed in the drawings.

1.3.4 The IP Security Camera System Integrator shall closely coordinate all work with the General Contractor, Structured Cabling System Contractor, and Electrical Contractor.

1.4 RELATED REQUIREMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

Electrical Specification Sections regarding conduit and raceway apply to work under this section, with the additions and modifications specified herein and on the communications drawings. The special requirements indicated on the communications drawings and in this specification section for structured cabling system conduit and cable pathways shall take precedence over any requirements specified in Electrical Specification Sections.

Refer to Section 17000 Communications Structured Cabling System for all cabling and conduit requirements.

1.5 EXAMINATION OF SITES AND TOTAL SYSTEM RESPONSIBILITY

Prior to providing a proposal for this work, the Contractor shall visit the proposed site of work to become familiar with any condition that may affect the work to be performed in any way. No allowances shall be made because of lack of knowledge of these conditions.

The Contractor shall have total system responsibility to assure a fully operational system. Any additional labor and components required for the installation of complete operating systems but not specifically required by the bid documents shall be provided and the cost borne by the Contractor.

The Contractor shall remain the sole owner of the system and all of its components provided under this contract and is responsible for all risk of loss or damage of the system for the entire contract period up to and including the date and time of Final Acceptance by the Engineer and the Owner's Project Manager. After the date of Final Acceptance, the Owner shall assume full ownership of the system with all components, and the warranty period shall commence

1.6 QUALITY ASSURANCE

Materials shall be new and shall be the best of their respective kinds. All work shall be accomplished in a workmanlike manner in keeping with the best practices and highest standards of the IP Security Camera System industry.

Protect materials and equipment from physical or environmental damage during shipping, storage and installation. Equipment and materials shall be received at the site in new condition and shall be maintained in new condition throughout the installation process. Damaged or deteriorated equipment and materials will not be acceptable. The Contractor shall be responsible for the safety and condition of all materials and equipment, whether stored or installed, until final acceptance by the Engineer and the Owner.

1.7 CODES AND STANDARDS

All work done under this contract shall be performed in accordance with the most recent issue of the following codes and standards. Where there is a perceived conflict between a standard and the contract documents, the Contractor shall perform the work as directed by the Engineer. Where no specific method or form of construction is called for in the Contract Documents, the

Contractor shall comply with code requirements when carrying out such work.

1.7.1 Codes:

a. Standard Building Code
b. National Electrical Code (NFPA 70)
c. National Electrical Safety Code (NESC)

1.7.2 Standards: All electrical materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments:

a. American National Standard Institutes (ANSI)
b. Institute of Electrical and Electronics Engineers (IEEE).
c. National Electrical Manufacturer's Associations (NEMA).
d. National Fire Protection Association (NFPA).
e. Occupational Safety and Health Act (OSHA).
f. Underwriter's Laboratories, Inc. (UL).
g. Electronic Industry Association (EIA).
h. Telecommunication Industry Association (TIA).
i. American Society of Industrial Security (ASIS)

1.8 SUBMITTALS

1.8.1 Submit three copies of the manufacturer’s catalog data and pre-installation drawings to the Engineer for approval prior to commencing work or ordering materials. Receive approval of the Engineer in writing for each item of submittals prior to commencing work.

1.8.2 Manufacturer's Catalog Data: Submit the producer's standard descriptive data sheets for each type of product being provided. Provide products in accordance with the drawings. Provide complete data sheets bearing the printed logo or trademark of the manufacturer. Mark each copy of the data sheets for the specific product being provided with an identifying mark, arrow, or highlighting. Submittals without such identifying marks shall be rejected without comment for resubmittal. The following are typical items that shall be submitted:

a. Cabling, each type (SCSC submit under Section 17000)
b. Cable Connectors (SCSC submit under Section 17000)
c. Cameras, each type, with all accessories including enclosures
d. All camera mounting brackets, goosenecks and other accessories
e. Recorded cameras video storage appliance
f. Fire-stopping, each type (each UL listed Assembly) (submit under Section 17000)
g. All conduit and pull boxes (submit under Division 16 specifications)
h. All other materials and equipment indicated on the drawings to be furnished under this section, whether specifically listed here or not.
i. All other information indicated on the contract drawings, and all additional information required by the Engineer.

1.9 CONTRACTOR'S RECORD DOCUMENTS

The Contractor shall maintain a full set of contract documents at the job site at all times, consisting of specifications, drawings, addenda, pre-installation submittals, change orders, and

engineering directives. The record documents shall be updated by the Contractor, in red pen and on a daily basis, to show the following:

a. Final location of all Cameras.
b. Final conduit routing.
c. Final location of all pull boxes and access doors.
d. Any changes to the work authorized by the Architect/Engineer.
e. Any other pertinent information that may be of value to the Owner in operating and maintaining the system.

The Contractor's record documents shall be available for viewing by the Engineer or the Owner at the site at any time and shall be presented and reviewed by the Contractor at each construction progress meeting. The record documents shall be clearly marked "Record Set", shall be kept in a protected location, and shall not be used for general construction purposes. The record documents shall be provided to the Engineer at the close of the project.

The Engineer will provide a full set of Adobe Acrobat *.PDF format drawings to the Contractor. The Contractor shall be required to annotate (redline) the Adobe Acrobat *.PDF format drawings using Adobe Acrobat to reflect all information recorded in the field. The Contractor shall provide a copy of the Adobe Acrobat *.PDF files on CD with each set of O&M Manuals and shall provide an additional copy on CD to the Engineer. The Contractor shall also provide 11”x17” laser prints of Adobe Acrobat *.PDF drawings in each O&M Manual.

2.0 PART 2 - PRODUCTS

2.1 General

All materials, equipment, and devices shall be new and unused, of current manufacture and of the highest grade, free from defects.

All products shall be the manufacturer and model or part number specified. Bid shall be for new equipment only. Newly manufactured (containing used or rebuilt parts), remanufactured, rebuilt, reconditioned, newly remanufactured, used, shopworn, demonstrator or prototype equipment is not acceptable and will be rejected. If required by the Engineer, the Contractor shall provide a written certification from the manufacturer referencing the serial number each item of equipment and stating that the equipment is new.

All materials, equipment and devices shall, as a minimum, meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70.

All like items of material or equipment shall be the same product of the same manufacturer.

All materials and equipment shall be a standard catalogued product of a manufacturer regularly engaged in the manufacture of similar products.

Where a model or part number is indicated in error for any reason, the Contractor shall verify the intent of the Engineer prior to providing a bid proposal, and shall provide the product intended by the Engineer. Where a manufacturer has updated or improved a product subsequent to issuance of the bid documents by the Engineer, the Contractor shall provide the

updated or improved product at no additional cost to the Owner.

2.2 Product Specifications:

To insure a uniform basis for bidding, and to standardize the Owner's facilities, base all bids on the particular systems, equipment and materials specified herein and indicated on the drawings which are based on a School District standard.

See drawings for all product requirements not indicated in these specifications. The Contractor shall be responsible for providing and installing all components indicated in these specifications and on the drawings, unless specifically indicated to be provided by others.

3.0 PART 3 - EXECUTION

General: The installation shall be in strict accordance with all applicable codes and standards, the respective manufacturer's written recommendations, and the contract drawings and these specifications.

All materials, equipment, and devices shall be new and unused, of current manufacture and of the highest grade, free from defects. Workmanship shall be of the highest grade in accordance with modern practice.

The installed system shall be neat, clean, and well organized in appearance. Provide working clearances for normal system operation, reconfiguration and repair.

All cabling shall be installed at times as determined by the Owner and may result in work being performed after normal business hours. Any additional costs associated with work required after normal business hours shall be included in the contractor's bid.

3.1 See Section 17000 for cabling, conduit, firestopping, cable testing, and other installation requirements. All cabling for security cameras shall be installed in continuous conduit.

The SCSC shall test each cable as indicated in Section 17000. Document results of testing and submit to Engineer for review and approval. The test log shall include camera identifier, the test date, the initials of the technician who tested the cable, and the test results.

3.2 CAMERA INSTALLATION

3.2.1 Camera locations and heights indicated on the drawings are approximate and are providing for purposes of bidding.

The General Contractor shall schedule meetings at the site prior to commencement of any installation activities by the SCSC and the conduit provider and additionally as construction proceeds to coordinate the exact location and coverage area of each camera prior to installation. The meetings shall include the General Contractor, the Owner's Project Manager and/or his designee, the SCSC, the conduit provider, and the IP Security Camera System Integrator. Final camera locations may be placed up to 10 feet away from locations shown without additional cost to the Owner. Particular attention shall be given to coordination of camera locations relative to obstructions including but not limited to exterior covered walkways, entrance canopies, gutter downspouts, and other camera views. The General Contractor shall be

responsible for providing information to the contractors and IP Security Camera System Integrator concerning obstructions which may not be fully built at the time any camera location is determined if that obstruction will negatively impact that camera's full field of view.

The SCSC shall install the cameras in accordance with the manufacturer's printed installation instructions and the mounting requirements indicated on the drawings, except that final camera locations shall be determined as indicated above.

After final camera locations are determined, the cameras are mounted and the cabling installed and tested by the SCSC, the IP Security Camera System Integrator shall test the operation of each camera and shall set final camera viewing angles, fields of view, lens settings, compression settings and other camera settings with the Owner's Project Manager or his designee. The IP Security Camera System Integrator shall notify the SCSC through the GC in writing if any cabling deficiencies are found, and the SCSC shall promptly correct those deficiencies.

3.3 HEADEND EQUIPMENT INSTALLATION AND PROGRAMMING

3.3.1 Headend equipment installation, setup and programming shall be provided by the IP Security Camera System Integrator. Cameras shall be recorded at the highest resolution offered for each camera type and the frame rate directed by the Owner.

3.4 SYSTEM VERIFICATION AND ACCEPTANCE

3.4.1 System Testing: Proof of performance of the IP Security Camera System to include a full system operational test shall be conducted in the presence of the Owner's Project Manager by the IP Security Camera System Integrator.

3.5 CHECKOUT

3.5.1 Subsequent to testing and verification and prior to the first day of normal operation following start-up, the IP Security Camera System Integrator shall be responsible for checking out the system to verify that it is operating properly and performing in compliance with the equipment manufacturer's specifications and the specifications. The checkout shall include a System Inspection Checklist to fully document checkout.

3.6 CLEANUP

3.6.1 Upon completion of the work each day the contractor shall reconnect any utilities, equipment, or appliances removed in the course of work and replace all furniture, etc., moved for the performance of the work. Debris and rubbish caused by the work shall be removed and the premises left clean each day. Vacuum clean all interior areas each day.

3.7 SUBSTANTIAL COMPLETION

3.7.1 The Structured Cabling System Contractor shall complete the installation of the IP Security Camera cabling not less than 30 days prior to the scheduled date for Substantial Completion to allow sufficient time for the IP Security Camera System Integrator to complete all work indicated to be provided under the IP Security Camera System Integrator Allowance and all work indicated in this specification to be provided by the integrator, to include User Training,

such that the IP Security Camera system shall be fully operational and ready for use by the school district and School Administration on the date of Substantial Completion.

3.8 FINAL COMPLETION

3.8.1 Following completion of the Substantial Completion punch list items and the initial performance period, the contractor shall notify the Engineer. The Engineer will conduct a final completion inspection. Upon determining that all punch list items have been satisfactorily completed, the Engineer will declare the work finally complete. For the purposes of this contract the terms Final Completion, Final Acceptance, and Final System Acceptance are synonymous.

3.9 DOCUMENTATION

3.9.1 Red-Line Record Documents:

Refer to paragraph "CONTRACTOR'S RECORD DOCUMENTS". Provide Record Documents, updated in red pen, to accurately reflect the finished installation.

Submit Red-Line Record Documents over to the Engineer at the Substantial Completion Inspection. Provide transmittal letter addressed to the Engineer indicating that the Contractor is providing one (1) set of Red-Line Record Documents.

3.9.2 Annotated Adobe *.PDF A-Built Drawings:

The Engineer will provide a full set of Adobe Acrobat *.PDF format As-Built Drawings to the Contractor. The Contractor shall be required to annotate (redline) the *.PDF format drawings using Adobe Acrobat to reflect all changes recorded in the field as required by the paragraph "CONTRACTOR'S RECORD DOCUMENTS". The Contractor shall provide a copy of the *.PDF files on CD with each set of O&M Manuals and shall provide an additional copy on CD to the Engineer. The Contractor shall also provide 11”x17” hardcopy laser prints of *.PDF drawings in each O&M Manual.

3.9.3 O & M Manuals: The contractor shall provide operating and maintenance manuals covering all equipment and materials furnished under this contract. The O & M manuals shall contain all information necessary for the operation, maintenance, replacement, installation, and parts procurement for the System. The information shall include detailed documentation equipment configuration. A complete recommended spare parts inventory list shall be included with the lead time and expected frequency of use for each part clearly identified.

A quantity of three (3) 8-1/2" x 11" loose leaf 3-ring binders with clear vinyl overlay designed to receive identification inserts shall be provided. The manuals shall contain the following sections:

a. Cut sheets for all equipment.
b. Installation instructions.
c. Operating and maintenance instructions.
d. Recommended spare parts inventory list.
e. User's Guides and technical reference guides.

f. Copy of warranty.

Provide a list with name, address, contact person, phone number, and fax number for two separate contacts with name and telephone number for warranty service and the manufacturer of each item of equipment with telephone number and sources of supply for parts.

3.10 USER TRAINING

User training shall be provided by the IP Security Camera System Integrator.

3.11 WARRANTY

All equipment including material used in the installation thereof shall be warranted for THREE YEARS by the Contractor against mechanical, electrical, and workmanship defects. In the event defects become evident within the warranty period, the Contractor shall repair or replace the defective parts and materials at no additional cost to the Owner. The warranty period shall start with the date of final acceptance. The warranty shall apply to all equipment provided under the provisions of this contract regardless of the location. Warranties submitted with bids, either appearing separately or included in pre-printed literature and price lists, shall not be acceptable and provisions herein take precedence.

The SCSC is not responsible for warranty of equipment and services indicated to be provided by the IP Security Camera System Integrator. The IP Security Camera System Integrator is not responsible for warranty of equipment and services indicated to be provided by the SCSC.

END OF SECTION 17050