094-PTA & 097 PTB
PARKING & TRANSPORTATION SERVICES
HVAC REPLACEMENT
SPECIFICATION

FOR

UNIVERSITY OF SOUTH FLORIDA
TAMPA CAMPUS

1311 USF PLUM DRIVE.
TAMPA, FLORIDA 33620

PREPARED BY:

ASR ENGINEERING INC.

9720 N. Armenia Ave, Suite F
Tampa, FL 33612
813-935-7280
asrengineering@earthlink.net

JANUARY 14, 2019
100% CONSTRUCTION DOCUMENTS

Specification Index

SECTION 001116 – INVITATION TO BID & INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1. PROJECT INFORMATION

A. Contractor shall refer to University of South Florida Invitation to Bid by visiting the following:

https://www.usf.edu/business-finance/purchasing/public-bids/current-bids.aspx

END OF SECTION 001116

SECTION 001153 – CONTRACTOR'S MINIMUM QUALIFICATIONS

MECHANICAL CONTRACTOR'S MINIMUM QUALIFICATIONS

A. Contractor shall have been in business for a minimum of 10 years as a Mechanical Contractor and licensed with the State of Florida at the time of Bid opening.
B. The Sub-Contractors and sub-sub-contractors shall be licensed in their trade.
C. Contractor shall have completed a minimum 5 similar mechanical renovation projects in the last 5 years each with a construction value of at least $200,000. List 5 similar projects on a separate page and attach to the qualification statement.
D. Contractor's superintendent shall have a minimum of 10 years' experience in similar projects.
E. Contractor shall also meet all installer/applicator qualifications given in technical specifications.

END OF SECTION 001153

USF FACILITIES MANAGEMENT

Contractor's Qualification Statement

FROM: _____
(Legal Name of Business)

_____
(Mailing Address of Principal Office)

_____
(City, State, Zip)

TO: USF Facilities Management

FOR: _____
(Name of Project)

CLASIFICATION OF WORK: *(If multiple classifications apply, submit a separate form for each)*

General Construction Sitework HVAC Electrical

Plumbing Other: _____

The undersigned, being first duly sworn, hereby deposes and affirms that the following information is true and sufficiently complete so as not to be misleading.

ORGANIZATION

YEARS IN BUSINESS: *(Number of years performing the classification of work indicated above. Check only one.)*

<3 3+ 5+ 10+ 15+

BUSINESS NAME:

How many years has your organization been in business under its current name? _____

List other or former names under which your organization has operated:

_____

_____

BUSINESS STRUCTURE:

Corporation

Date of Incorporation: _____

State of Incorporation: _____

President's Name: _____

Vice President's Name: _____

Secretary's Name: _____

Treasurer's Name(s): _____

Partnership

Date of Organization: _____

Type of Partnership: _____

Names of General Partners: _____

Individual

Date of Organization: _____

Name of Owner: _____

Other *(Please specify)*

Type of Organization: _____

Date of Organization: _____

Name of Principal(s): _____

LICENSING:

List jurisdictions and trade categories in which your organization is legally qualified to do business *(indicate license or registration numbers where appropriate)*:

_____

_____

_____

List jurisdictions in which your organization's partnership or trade name is filed:

_____

_____

_____

EXPERIENCE:

List categories of work typically performed by your organization's own forces:

_____

_____

_____

CLAIMS AND SUITS: *(If the answer to any of the questions below is "yes," attach details)*

Has your organization ever failed to complete any work awarded to it?	Yes	No
Are there any judgements, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?	Yes	No
Has your organization filed any law suits or requested arbitration pertaining to any construction contract(s) within the last five years?	Yes	No
Has any principal or officer of your organization ever been a principal or officer of another organization when it failed to complete any construction contract(s) within the last five years?	Yes	No

CURRENT WORKLOAD:

On a separate sheet, list the major construction projects currently being executed by your organization. Identify the name of the project, owner, design professional, contract value, percent complete and scheduled completion date.

State the total worth of work in progress and under contract: $ _____

RECENT WORKLOAD:

On a separate sheet, list projects of similar scope and budget as compared with the project for which you are applying, and which your company has completed within the last five years by your organization. Identify the name of the project, OWNER'S CURRENT CONTACT INFORMATION, design professional, contract value, percentage of the cost of work performed by your organizations own forces, and the completion date.

KEY PERSONNEL:

On a separate sheet, list the construction experience and present commitments of your organization's key personnel.

REFERENCES:

Trade References:

(Name of Individual)	*(Name of Individual)*
(Name of Business)	*(Name of Business)*
(Mailing Address)	*(Mailing Address)*
(City, State, Zip)	*(City, State, Zip)*
(Telephone)	*(Telephone)*

Surety: *(for projects requiring surety bonds):*

Bonding Company:	**Agent:**
(Legal Name of Business)	*(Name of Individual)*
(Mailing Address of the Principal Office)	*(Legal Name of Business)*
(City, State, Zip)	*(Mailing Address of the Principal Office)*
	(City, State, Zip)
	(Telephone)

SIGNATURE AND AFFIDAVIT:

Signed, sealed and delivered this _____ day of _____ ,20 _____

By: _____
(Signature of Affiant)

_____
(Printed Name of Affiant)

_____
(Title of Affiant)

_____
(Legal Name of Business)

Corporate Seal

STATE OF FLORIDA
COUNTY OF HILLSBOROUGH

Before me, the undersigned authority, personally appeared _____
(Printed Name of Affiant)

Who, after being first duly sworn, deposes and says that the information provided hereinabove is true and sufficiently complete so as not to be misleading.

Sworn to and subscribed before me this _____day of_____,20_____by

_____ who is personally known to me or produced
(Name of Affiant)

_____ as identification and did take an oath.
(Type of Identification)

Notary Public: _____
(Signature of Notary Public)

My Commission Expires: _____
(Date)

Notary Seal

SECTION 004143 – BID FORM

1. Contractor shall refer to University of South Florida current public bids by visiting the following:

   https://www.usf.edu/business-finance/purchasing/public-bids/current-bids.aspx

END OF DOCUMENT 004143

SECTION 007200 – GENERAL CONDITIONS & SAMPLE CONTRACT

Please refer to the following General Conditions and USF Sample Contract.

University of South Florida
Independent Contractor Agreement

This University of South Florida Independent Contractor Agreement ("Agreement") is hereby entered into by and between The University of South Florida Board of Trustees**,** a public body corporate acting for the University of South Florida and its component colleges, departments and divisions ("Owner"), and **[Name of Company]** ("Contractor") as of the date last signed below ("Effective Date"). Owner and Contractor may collectively be known herein as "the Parties".

NOWTHEREFORE, the Parties hereby agree as follows:

1. Agreement. This Agreement serves as the award of USF Invitation to Bid **[ITB # / Bid Name]** ("ITB") to which Contractor was a respondent. The terms and conditions of the ITB (including the Drawings and Specifications referenced therein along with the addenda thereto), the General Conditions of the Contract for Construction ("Exhibit A") attached hereto, and Contractor's response to the ITB ("Contractor's Response) are expressly incorporated into this Agreement. The terms and conditions of this Agreement, the ITB, Exhibit A, and the Contractor's Response are intended to be read in conjunction with each other to every extent possible; however, in the event of a conflict, the documents shall control in the following priority: 1) this Agreement; 2) Exhibit A; 3) the ITB; and 4) Contractor's Response.

2. Deliverables. If Work results in deliverables, such as, articles, reports, marketing materials, project narratives, websites, mobile applications, video or audio recordings, etc., except for express exclusions set forth in herein, any such deliverables will be considered work made for hire and become the exclusive property of Owner. Contractor hereby assigns, transfers, and conveys to Owner any and all rights, title, and interests Contractor may have or accrue in such deliverables, and such deliverables will otherwise be deemed to be works made for hire under the U.S. Copyright Act [17 U.S.C. §101, et seq.].

3. Contract Time. Performance under this Agreement will begin on the Effective Date. The Work must be substantially completed by **[Date]** with final completion by **[Date]** unless extended by future amendment to this Agreement.

4. Contract Sum. In consideration for the Contractor's complete and satisfactory performance of the Work as described in this Agreement, Owner will pay to the Contractor an amount **NOT TO EXCEED [Amount in words], (Amount in numerals)]** unless modified by a future amendment to this Agreement.

5. Payment. All Contractors providing Work to Owner must submit invoices to Owner in order to receive payment. Owner will issue the Contractors' payment within thirty (30) days after receipt of an acceptable invoice and receipt, inspection, and acceptance of Work provided in accordance with the terms and conditions of the this Agreement. If the payment is not made within forty (40) days, a separate interest penalty (established pursuant to § 55.03, Florida Statutes) on the unpaid balance will be paid upon Contractor's written request to Owner, providing said request is received by Owner no later than thirty (30) days from the date shown on Owner's check. Interest of less than One Dollar ($1) will not be enforced.

Contractors must submit detailed invoices sufficient for a proper pre-audit and post-audit thereof. Each invoice must clearly identify the Work, portion of Work, and expenses for which compensation is sought. Owner will determine the accuracy of all invoices. Invoices that have to be returned to the Contractor because of preparation errors will result in a delay of the payment. In such cases, the invoice payment requirements do not start until a properly completed invoice is accepted by Owner.

Contractor may request partial payment in the full amount of the value of Work received and accepted by Owner by submitting a properly executed invoice with supporting documents, as required. Owner's vendor ombudsman, whose duties include acting as an advocate for vendors who may be experiencing problems in obtaining timely payment(s) from Owner may be contacted at 813-974-2481. Written inquiries can be addressed to: *Procurement Services, 4202 E. Fowler Ave., SVC 1073, Tampa, FL 33620*.

6. Taxes. The State of Florida, and Owner as a state agency, is a tax immune sovereign and exempt from the payment of all sales, use, and excise taxes. The Contractor will be responsible for all taxes necessary to perform under this Agreement and all taxes on Contractor income generated through this Agreement.

7. Travel and Ancillary Expenses. If Owner agrees to directly reimburse Contractor for travel, meals, lodging, and other expenses under this Agreement, such expenses must be documented. Documentation must be submitted with Contractor invoices, unless otherwise directed. All such expenses will be paid in accordance with Section 112.061, Florida Statutes and Owner's Travel Manual. Any non-documented expenses and/or expenses incurred outside the method and/or in excess of the amounts prescribed by Florida law or Owner policy will be borne by Contractor.

8. Amendments. Any changes, amendments, or modifications to the Agreement must be in writing and signed by both parties to be effective.

9. Assignment. Contractor may not, without the advance written approval of Owner, assign any right or delegate any duties hereunder nor may it transfer, pledge, surrender, or otherwise encumber or dispose of its interest in any portion of the Agreement.

10. Public Records Law. Owner and Contractor agree not to directly or indirectly disclose to third parties any confidential or proprietary information. Notwithstanding the preceding statement or any other confidentiality provisions in the Agreement, as an agency or subdivision of the State of Florida, Owner is subject to Chapter 119, Florida Statutes ("Florida Public Records Act"). As such, the Agreement and all associated materials and information may be considered a "public record". While Owner will endeavor not to voluntarily disclose the Agreement or other associated information, it reserves the absolute right to interpret its legal obligations under the Florida Public Records Act. Any necessary disclosure of the Agreement or any other information pursuant to a public records request will not be considered a breach of any confidentiality provisions.

Further, Contractor may be considered a Contractor of a public agency as defined in § 119.0701(1)(b), and may be required by law to keep and maintain public records related to its services; provide copies of, or allow inspection of, such public records to Owner upon request; and ensure that exempt or confidential and exempt records are not disclosed except as authorized by law. Upon completion of the Agreement or performance of the services, Contractor may transfer all public records related to the services to Owner, at no cost to Owner, or may keep such public records in accordance with the applicable state record retention requirements. If Contractor chooses to transfer such records to Owner, Contractor may destroy any duplicate records in its possession that are exempt or confidential and exempt from disclosure.

OWNER CANNOT PROVIDE LEGAL ADVICE TO CONTRACTOR REGARDING ITS LEGAL DUTIES. HOWEVER, CONTRACTOR MAY CONTACT OWNER'S CUSTODIAN OF PUBLIC RECORDS AT USFPURCHASING@USF.EDU OR 813-974-2481 IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES TO THE CONTRACTOR'S DUTY TO PROVIDE AND MAINTAIN PUBLIC RECORDS RELATING TO THIS AGREEMENT.

Owner may unilaterally cancel the Agreement for refusal by Contractor to comply with the provisions of Chapter 119, Florida Statutes.

11. Force Majeure. No default, delay, or failure to perform on the part of the either party will be considered a default, delay, or failure to perform otherwise chargeable, hereunder, if such default, delay, or failure to perform is due to causes beyond either party's reasonable control including, but not limited to, strikes, lockouts, or inactions of governmental authorities; epidemics; acts of terrorism; war; embargoes; fire; earthquake; acts of God; or default of common carrier. In the event of such default, delay, or failure to perform, any date or times by which either party is otherwise scheduled to perform will be extended automatically for a period of time equal in duration to the time lost by reason of the excused default, delay, or failure to perform.

12. Availability of Funds. Owners' performance and obligation to pay under this Agreement is contingent upon one or more of the following: annual appropriation by the Florida Legislature and funding from other public and/or private institutions. The Agreement may be canceled without further obligation on the part of the Owner, if sufficient funding is unavailable to assure full performance under the Agreement. In such an event, Owner will issue written notice to Contractor of the unavailability of said funds, thereby immediately terminating the Agreement with no further obligation or penalty. Upon issuance of such notice, the Contractor is entitled to payment for only the Work provided prior to the date notice is issued.

13. Sovereign Immunity. Nothing in the Agreement will be construed as an indemnification of the Contractor by Owner. Owner warrants and represents that as a sovereign entity, it is self-insured. Owner assumes any and all risk of personal injury and property damage attributable to the negligent acts or omissions of Owner and the officers, employees, servants, and agents thereof while acting within the scope of their employment by Owner. Contractor and Owner agree that nothing contained herein will be construed or interpreted as (a) the consent of Owner and State of Florida, their agents and agencies to be sued except as provided for herein; or (b) a waiver of sovereign immunity by Owner and the State of Florida beyond that provided in § 768.28, Florida Statutes.

14. Limitation of Liability. As sovereign agency or subdivision of the State of Florida, Owner's self-insurance limitations are provided by law. Owner is provided with comprehensive general liability insurance through the State Risk Management Trust Fund with limits of coverage up to a maximum of $200,000 per occurrence and $300,000 in aggregate pursuant to the terms and limitations of § 768.28 and Chapter 284, Part II, Florida Statutes or as amended. Owner will provide evidence of its self-insurance statute upon request. The parties agree that this is sufficient in lieu of any other insurance requirements. Owner's total liability will not exceed the limits of its self-insurance coverage as defined by Florida Statutes.

15. Relationship of Parties. It is understood and agreed that nothing herein contained is intended, or should be construed, as creating or establishing the relationship of partners between the Parties hereto, or as constituting Contractor as the agent or representative of Owner to any contracts or other obligations. Contractor must not expressly or impliedly represent to any

party that Contractor and Owner are partners or that Contractor is the agent or representative of Owner for any purpose or in any manner whatsoever. The Parties are independent contractors and neither party will have supervision or control over the other party's employees, faculty, staff, students, representatives, or volunteers in the performance of their duties. Contractor must not use the name, logo, or intellectual property of Owner for marketing purposes, or otherwise, without the prior written consent of Owner.

16. Contractor Personnel. In the event vendor personnel, to include the employees, contractors, and agents of Contractor, are required to provide services to Owner at its campuses, facilities, or events, Contractor must make commercially reasonable efforts to ensure that its personnel act in a manner that assists Owner in providing a safe environment for its students, faculty, staff, and visitors and protects the reputation of Owner. Contractor agrees that it and all of its personnel will carry out their duties under the Agreement in accordance with all Owner policies as well as local, state, and federal law, including but not limited to laws governing employee compensation and insurance coverage and Owner's policies governing discrimination and sexual harassment. Contractor must ensure that its personnel performing services under the Agreement are aware of their obligations and are appropriately and regularly trained to ensure compliance with these requirements and, when required by Owner, have completed an appropriate background check in accordance with Chapter 435, Florida Statutes. In the event vendor personnel violate the law or Owner policy, as determined by law enforcement or Owner policy, in Owner's sole discretion, after investigating such violations, Owner may request that such personnel are restricted from performing services under the Agreement. It is expressly agreed to by the Parties that multiple violations of this section will be deemed a material breach by Contractor and subject to the termination in accordance with the Agreement. Owner's regulations and policies are available for review at http://regulationspolicies.usf.edu/.

17. Delivery of Notice. All notices described in this Agreement must be delivered to the addresses below in accordance with the method of delivery required for a given notice. In addition to the address provided below, Contractor must send any mailed notices to this address as well: *Procurement Services, 4202 E. Fowler Ave., SVC 1073, Tampa, FL 33620*.

Addressee:	USF FM	**[Contractor Name]**
Street Address:	4202 E. Fowler Avenue, OPM100	**[Contractor Address]**
City, State, Zip:	Tampa, FL 33620	**[Contractor City]**
Email Address:	Timothy45@usf.edu; slafferty@usf.edu	**[Contractor E-mail]**

18. Americans With Disabilities Act ("ADA"). The Contractor must comply with the ADA of 1990 (P.L. 101-336).

19. No Lobbying. The expenditure of funds disbursed from State of Florida appropriated grants and aids for the purpose of lobbying the Legislature or a State agency is prohibited. Contractor warrants that no individual employed by it conducts any lobbying activities.

20. No Employee Relationships. In accordance with § 112.3185, Florida Statutes, the Contractor hereby certifies that to the best of their knowledge and belief no individual employed by them or subcontracted by them has an immediate relation to any employee of Owner who was directly or indirectly involved in the procurement of said services. Violation of this section by Contractor will be grounds for immediate cancellation of this Agreement by Owner.

21. Federal Suspension and Debarment. The Contractor affirms to the best of their knowledge and belief, that the business or payee identified in this contract and its principals are not presently debarred, suspended, proposed for debarment ineligible, or voluntarily excluded by any Federal Department or Agency. To the extent this assertion proves inaccurate, Owner may, in its sole discretion, terminate this agreement without penalty to Owner.

22. Public Entity Crime. Any person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not be awarded or perform work under a contract or transact business with any public entity in excess of the threshold amount provided in § 287.017, Florida Statutes for CATEGORY TWO for a period of 36 months from the date first placed on the list.

23. Materiality of Terms. Each term and condition of the Agreement is material and any breach or default by Contractor in the performance of each such term and condition will be a material breach or default of the entire Agreement for which Owner will have the right to terminate the Agreement, without termination penalty to Owner, effective upon thirty (30) days prior written notice to Contractor, if Contractor fails to remedy the material breach within thirty (30) days following notice thereof.

24. Waiver of Rights. No failure to exercise or delay in exercising any right, power, or remedy accruing to Owner on any breach or default of Contractor hereunder will impair any such right, power, or remedy, or be construed as a waiver of any such breach or default or of any similar breach or default thereafter occurring; nor will any waiver of any single breach or default be construed as a waiver of any other breach or default.

25. Survivability. In the event of termination, term expiration, or the completion of the Work to be provided by Contractor hereunder, those provisions, which by their nature must survive the Agreement to achieve their intended purpose, will remain operative and in full force and effect.

26. Severability. In the event any provision of this Agreement is deemed to be void, invalid, or unenforceable, that provision will be severed from the remainder of this Agreement so as not to cause the invalidity or unenforceability of the remainder of this Agreement. All remaining provisions of this Agreement will then continue in full force and effect. If any provision is deemed invalid due to its scope or breadth, such provision will be deemed valid to the extent of the scope and breadth permitted by law.

27. Attorney Fees. In case suit or action instituted by Owner or Contractor to enforce compliance with this Agreement, the prevailing party shall be entitled to recover reasonable attorney fees from the other party as ordered by a court of competent jurisdiction, in addition to other costs and disbursements provided by statute and ordered by such a court.

28. Governing Law. The Agreement is governed by the laws of the State of Florida without regard for its conflict of laws provisions. The exclusive venue for all disputes arising out of this Agreement will be state and federal courts located in Tampa, Florida and the parties irrevocably submit to the personal jurisdiction of such courts.

29. Electronic Signatures and Counterparts. Electronic signatures will be valid when applied according to the "Electronic Signature Act of 1996" and the "Uniform Electronic Transaction Act" of Chapter 668, Florida Statutes. This Agreement may be executed by signatures applied to separate copies of the Agreement provided both documents contain identical terms and conditions.

30. Authority. Each person signing on behalf of the Parties to the Agreement represents and warrants that they have full authority to execute the Agreement on behalf of such party and that the Agreement will constitute a legal and binding obligation of such party.

By their duly authorized signatures below, the Parties hereby enter into this Agreement:

UNIVERSITY OF SOUTH FLORIDA BOARD OF TRUSTEES		**[COMPANY NAME]**	
Signature:	_____	Signature:	_____
Printed:	_____	Printed:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

INDEX

ARTICLE 1 GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Agreement between Owner and Contractor (herein after the Agreement), these General Conditions of the Contract for Construction, the USF Invitation to Bid **[ITB #] [Project Name]** (including the Drawings and Specifications referenced therein along with addenda thereto), and Modifications issued after execution of the Agreement. A Modification is: (1). a written amendment to the Contract signed by both parties, (2). a Change Order, (3). a Construction Change Directive, or (4). a written order for a minor change in the Work issued by the Architect/Engineer.

1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind between: (1). the Architect/Engineer and Contractor, (2). the Owner and a Subcontractor or Sub-subcontractor or (3). any persons or entities other than the Owner and Contractor. The Architect/Engineer shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect/Engineer's duties.

1.1.3 THE WORK

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

1.1.4 THE PROJECT

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

1.1.5 THE DRAWINGS

The Drawings are Ute graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedule and diagrams.

1.1.6 THE SPECIFICATIONS

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

1.1.7 THE PROJECT MANUAL

The Project Manuel is the volume usually assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 Execution of the documents shall be accomplished by: signing six (6) copies of the Agreement within which the Conditions of the Contract, the Drawings and the date of their latest revisions, the Specifications, and all Addenda issued prior to signing of the Agreement are identified. The Contractor shall execute and return all required forms of the Agreement within ten (10) days of their receipt. Failure to return all forms correctly executed within ten (10) days of receipt without written extension by the Owner otherwise, shall constitute an irregularity and shall constitute grounds, at the Owner's option, either for rejection and forfeiture of Bid Bond or for the deduction on a day for day basis from the time allotted for completion of the Work under **Paragraph 4.1** (Time of Commencement and Completion) of the Agreement. If the Contractor is a firm or company owned by an individual, the Agreement shall be executed in the name of the firm or company by the manual signature of the owner. If the Contractor is a partnership, the Agreement shall be executed in the name of the partnership by the manual signature of the partner or partners. If· the Contractor is a corporation, the Agreement shall be executed in the name of the corporation and shall bear the corporate seal. It may be signed for the corporation by the president attested by the secretary; if signed for the corporation by other officer than the president, the signature of such officer signing shall be attested by the secretary, and the executed Agreement shall be accompanied by a duly authenticated document bearing the seal of the corporation, quoting the section of the by-laws of the corporation authorizing the board of directors to designate such officer and copy of the resolution designating and authorizing him to execute on behalf of the corporation. That document must contain a statement that the authority is in effect on the date of the execution of the Contract, and may not be dated earlier than the date of the execution of the Contract. The same officer may not execute the Contract and authenticate the document of authority.

1.2.1.1 Performance and Payment bonds shall be executed on behalf of the Contractor in the same manner and by the same person who executed the Agreement.

1.2.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be performed and correlated personal observations with requirement of the Contract Documents.

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

1.2.3.1 Where reference is made to the Standard Specifications of the American Society for Testing and Materials (ASTM) or other standard specifications in connection with the required quality of materials, methods, etc., then the applicable specifications shall be of the latest revised edition effective as of the date the bids are opened by the Owner, unless otherwise expressly provided the technical specifications.

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

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

1.3 OWNERSHIP AND USE OF ARCHITECT/ENGINEER'S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

1.3.1 The Drawings, Specifications and other documents prepared by the Architect/Engineer are instruments of the Architect/Engineer's service through which the Work to be executed by the Contractor is described. The Contractor may retain one contract record set, and the Owner may retain two contract record sets. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright of the Drawings, Specifications and other documents prepared by the Architect/Engineer, and unless otherwise indicated the Architect/Engineer shall be deemed the author of them and will retain all common law, statutory and other reserved rights, in addition to the copyright. All copies of them, except the Contractor's record set and the Owner's record set, shall be returned or suitably accounted for to the Architect/Engineer, and copies thereof furnished to the Contractor, are for use sorely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other Projects or for addition to this project outside the scope of the Work without the specific written consent of the Owner and Architect/Engineer. The Contractor, Subcontractor, Sub-contractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect/Engineer appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any shown in the Drawings, Specifications and other documents prepared by the Architect/Engineer. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect/Engineer's or other reserved rights.

1.4 CAPITALIZATION

1.4.1 Terms capitalized in these General Conditions include those are: (1). specifically defined, (2). the titles of numbered articles and identified references to Paragraphs and Subparagraphs in the document or (3). the titles of other documents published by other professional organizations or public entity.

1.5 INTERPRETATION

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

ARTICLE 2 OWNER

2.1 DEFINITION

2.1 1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if: singular in number. The term "Owner" means the Owner or Owner's authorized representative.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 The Owner shall, at the request of the Contractor, prior to execution of the Agreement furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. (Note: unless such reasonable evidence were furnished or request prior to the execution of the Agreement, the prospective contractor would not be required to execute the Agreement or to commence the Work)

2.2.2 The Owner shall furnish through the Architect/Engineer, necessary surveys, describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

2.2.3 Except for permits and fees which are the responsibility of the Contractor under the, Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use, or occupancy of permanent structures or for permanent changes in existing facilities.

2.2.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work.

2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals for execution of the Work as established in the Special Conditions. If additional sets are required by the Contractor, they will be furnished upon request for the cost of printing and handling.

2.2.6 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to **Article 6** (Construction by Owner or by Separate Contractors) and **Article 9** (Payments and Completion) herein.

2.3 OWNER'S RIGHT TO STOP THE WORK

2.3.1 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by **Paragraph 12.2** (Correction of Work) herein, the Owner by written order signed personally or an agent specifically so empowered by the Owner in writing may order the Contractor to stop the Work, or any portion thereof; until the cause for such order has been eliminated; however, the right of the Owner to stop the shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of any other person or entity, except to the extent required by **Subparagraph 6.1.3** (Coordination of Work by Separate Contractors) herein.

2.4 OWNER'S·RIGHT TO CARRY OUT THE WORK

2.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven day period after receipt of written notice from the Owner to commence and continue correction of such defects or neglect with diligence and promptness, the Owner may after such seven day period give the Contractor a second written notice to correct such deficiencies within a second seven day period. If the Contractor within such second seven day period after receipt of such second notice fails to commence and continue correct any deficiencies, the Owner may without prejudice to other remedies, the Owner may have, correct such deficiencies. In such case an appropriate Change Order or Construction Change Directive shall be issued deducting from payments then or thereafter due to Contractor the cost of correcting such deficiencies, including compensation for the Architect/Engineer's additional services expenses made· necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect/Engineer. If payment then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

2.5 OWNER'S PROJECT REPRESENTATIVES

2.5.1 The Owner shall provide a Project Manager to represent the Owner in administration and management of the Contract on the Owner's behalf.

2.5.2 The Owner shall provide a construction coordinator inspector to represent the Owner in the Construction of the project on the Owner's behalf.

2.5.3 The Owner's Project Manager and/or Construction Coordinator/Inspector are not the Owner's Authorized Designee.

2.6 CONSTRUCTION SERVICES EVALUATIONS

2.6.1 The Contractor will be evaluated by the university while under contract; annually for major projects, at the completion of the project for minor projects, and at additional times if determined by the University to be beneficial in the development of a project. See sample evaluation forms **PMG-28B** (Contractor Evaluation Form) and **PMG-28C** (Contractor Evaluation by Customer).

ARTICLE 3 CONTRACTOR

3.1 DEFINITION

3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or ·the Contractor's authorized representative.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 The Contractor shall carefully study and .compare the Contract Documents with each other and with information furnished by the Owner pursuant to **Subparagraph 2.2.2** (Owner furnished Surveys) herein,

and shall at once report to the Architect/Engineer errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the Owner or Architect/Engineer for damage resulting from errors, inconsistency or omissions in the Contract Documents unless the Contractor recognized such error, inconsistency or omission and knowingly failed to report to the Architect/Engineer. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect/Engineer, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.2.2 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported to the Architect/Engineer at once.

3.2.3 The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to **Paragraph 3.12** (Shop Drawings, Product Data and Samples) herein.

3.3. SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work and the Contract, unless Contract Documents give other specific instructions concerning these matters.

3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work ·under a contract with to the Contractor.

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

3.3.4 The Contractor shall be responsible for inspection of portions of Work already performed under this Contract to determine that such portions are in proper condition to receive subsequent Work.

3.3.5 The Architect/Engineer will schedule periodic construction meetings; which the Contractor shall be required to attend.

3.3.6 The Contractor shall be responsible for coordinating the work with the A/E and the Owner's Representatives to assure performance of the work in a manner that is safe, and protects the health and well-being of the University occupants, without unacceptable interruptions or impacts on the University. The Contractor shall obtain prior approval and provide advance notification to the University for coordination and approval prior to implementing work that would impact the University including delivery of materials, staging, power or telecommunications interruptions, etc.

3.4 LABOR AND MATERIALS

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

3.4.1.1 It shall be the responsibility of the Contractor to provide at the Contractor's expense, the power, fuel and equipment necessary to maintain climate conditions including humidity and specified or necessary for Work in progress.

3.4.2 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit person or persons not skilled in tasks assigned to them.

3.5 WARRANTY

3.5.1 The Contractor warrants to the Owner and the Architect/Engineer that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contactor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under oral usage. If required by the Architect/Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.5.2 As required in **Subparagraph 12.2.2** (Correction of Work) herein, the Contractor shall warrant all materials and equipment in accordance with the conditions of the contract. The Contractor shall correct all work found to be defective, or not in accordance with the requirements of the contract documents, for a period of one (1) year from the date of Substantial Completion, or for such longer periods of time for specific warranties required by the contract documents and for the list of items to be completed or corrected at Substantial Completion, unless otherwise agreed to in writing, at no additional cost to the Owner. The Contractor shall conduct, jointly with the Architect and Owner, a warranty inspection forty-five (45) days prior to the end of the warranty periods to address completion of warranty obligations. The Owner shall provide notice to the Contractor of work that requires correction during the warranty periods.

3.5.3 The Contractor shall be responsible to assure that Asbestos Containing Materials (ACM) are not incorporated in the scope of work for the project. The Contractor shall provide Material Safety Data Sheets for all products and materials for the project and shall certify that Asbestos Containing Materials have not been incorporated in the scope of work.

3.6 TAXES

3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

3.6.2 The Owner reserves the right to require the Contractor to develop, manage and administer a sales tax exempt purchasing program by Change Order to this contact if it is determined to be in the best interest of the University, in accordance with the requirements of the Department of Revenue and in adherence with **DOPO** (USF Owner Direct Purchase Order Program). If Implemented, the Contractor shall name the Owner as an additional insured on the Contractor's Builder's Risk Insurance to continue to cover the direct purchase materials and the Owner shall pay for the cost of such insurance.

3.7 PERMITS, FEES AND NOTICES

3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work, including any connection permits required which are customarily secured after execution of the contract and which are legally required when bids are received or negotiations concluded.

3.7.2 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities bearing on performance of the Work.

3.7.3 It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect/Engineer and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

3.7.4 If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect/Engineer and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs.

3.8 ALLOWANCES

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

3.8.2 Unless otherwise provided in the Contract Documents:

- **.1** materials and equipment under an allowance shall be selected promptly by the Owner to avoid delay in the Work;
- **.2** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.3** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances;
- **.4** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1). the difference between actual costs and the allowances under **Subparagraph 3.8.2.2** (Contractor's Cost) and (2). changes in Contractor's costs under **Subparagraph 3.8.2.3** (Unloading and Handling) herein;
- **.5** the Contractor shall solicit from information provided by the Architect/Engineer at least three bids for all allowance items from Subcontractors or material suppliers acceptable to the Owner, the Contractor and the Architect/Engineer. The Architect/Engineer shall review the bids and recommend to the Owner the acceptance or rejection of the lowest bid. If accepted the Architect/Engineer shall issue a change order to the Contractor as provided in **Subparagraph 3.8.2.4** (Adjustment of Contract Sum) herein.

3.9 PROJECT STAFF

3.9.1 The Contractor shall employ a competent Field Staff including a Project Manager, a Superintendent, a Secretary/Assistant, and if necessary due to the needs of the Project, additional assistants, all to be acceptable to the Owner, who shall be in attendance at the Project site during performance of the Work. The Contractor shall provide required resources at the Project site to assist the Field Staff to meet the requirements of the Contract Documents. The Field Staff shall represent the Contractor, and communications given to the Field Staff shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case. The Field Staff qualifications shall meet or exceed the experience, expertise and ability required for this project.

3.9.2 The Contractor shall employ Home or Branch office employees and provide required resources to support the project and the Field Staff to meet the requirements or the Contract Documents.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect/Engineer's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

3.10.2 The Contractor shall prepare and keep current, for the Architect/Engineer's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect/Engineer reasonable time to review submittals. The schedule of submittals shall indicate the dates by which the Architect/Engineer must notify the Contractor of the outcome of the review in order to avoid extension of the Contract Time.

3.10.3 The Contractor shall conform to the most recent schedules.

3.10.4 Within thirty (30) days after the date of the Owner's issuance of a Notice to Proceed with performance of the Work, the Contractor shall prepare and submit to the Architect/Engineer a construction

schedule in quadruplicate. This schedule shall graphically depict the contemplated activities which are necessary incidents to performance of the Work, showing the sequence the Contractor proposes for each activity to occur and the duration (dates of commencement and completion, respectively) of each such activity.

The Construction schedule shall be a critical path schedule that identifies, in detail, the start dates, end dates and critical dates of each subcontract activity and work requirement within the overall project development. The Construction schedule shall include milestone dates, dates to coordinate utility, road, etc. work that impacts the Owner for interruptions, shutdowns, etc. and benchmark dates to assure that the work is being performed to meet Contract Document requirements.

3.10.5 Following development and submittal of the construction schedule as aforesaid, the Contractor shall, at the end of each calendar month occurring thereafter during the period of time required to finally complete the subject Work or at such earlier intervals as circumstances may require, update and/or revise the construction schedule to show the actual progress of the Work performed and the occurrence of all events which have affected the progress of performance of the Work already performed or which will affect the progress of performance of the Work yet to be performed. Each such update and/or revision to the construction schedule shall be submitted to the Architect/Engineer in quadruplicate. Failure of the Contractor to update, revise and submit the construction schedule as aforesaid shall be sufficient grounds for the Architect/Engineer to find the Contractor in substantial default and certify to the Owner that sufficient cause exists to terminate the Contract or to withhold payment to the Contractor until a schedule or schedule update acceptable to the Architect/Engineer is submitted.

3.10.6 The Contractor shall have the option of scheduling a Substantial Completion date occurring earlier than the date established by the Contract Documents for Substantial Completion; provided, however, in such event, such earlier Substantial Completion date will be recognized by the Owner only as a matter of convenience to the Contractor and shall not change the date for Substantial Completion established by the Contract Documents or be otherwise binding on the Owner or anyone under the Owner's control; and provided further, however, in such event, should events occur during performance of the Work which would justify the granting to the Contractor of an extension of the Contract Time pursuant to the provisions of **Article 8** (Time) herein, the Contractor shall be entitled to receive only such an extension of Contract Time as is determined by the Architect/Engineer to be due the Contract or as follows:

- **.1** In the event the current Contractor's construction schedule indicates completion ahead of the contractually established date for Substantial Completion, the revised Substantial Completion date shall be determined by adding the total time directly affecting the critical path of the schedule to the end date of the current schedule. No extension of time beyond the contractually established date shall be granted until the aggregate of the current Contractor's construction schedule plus approved extension exceeds the date established by the Contract Documents, at which time the time extension granted will be the net difference between the contractually established date and the aggregate of the current Contractor's construction schedule plus approved extensions thereto.
- **.2** In the event the current Contractor's construction schedule indicates completion at or after the contractually established date for Substantial Completion, the time extension shall only be added to the contractually established date for Substantial Completion.
- **.3** The Owner will not grant time extensions based on improper scheduling of the Work.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These Drawings, Product Data, Samples and similar required submittals shall be available to the Architect/Engineer and shall be delivered to the Architect/Engineer for submittal to the Owner upon completion of the Work.

3.11.2 The Contractor shall provide a record copy of the drawings that reflect as-built conditions for the Project for use in developing record drawings to facilitate the University's Space Management Program, in addition to use for maintenance and future renovation work. The Owner may withhold payments due and/or reject payment requests for failure of the Contractor to submit a record copy of the drawings.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

3.12.4 Shop Drawings, Project Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect/Engineer is subject to the limitations of **Subparagraph 4.2.7** (Architect/Engineer Review) herein.

3.12.4.1 Information submitted shall show the capacity, operating conditions and all engineering data and descriptive information necessary for comparison and to enable the Architect/Engineer to determine compliance with the specifications.

3.12.5 The Contractor shall review, approve and submit to the Architect/Engineer Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.

3.12.5.1 Shop Drawings shall be fully identified by Project Name, location, supplier's name, date, drawing number and specifications section reference. The Contractor shall submit four (4) copies (in addition to those copies necessary for the Contractor's own requirements) of all Shop Drawings and schedules, or any required resubmission thereof required for the Work of the various trades, to the Architect/Engineer for approval. The Contractor shall make no deviation from the approved drawings, and the changes made thereto by the Architect/Engineer, if any.

3.12.5.2 It shall be the responsibility of the Contractor to properly schedule the submission of Shop Drawings for approval to allow adequate time for checking of drawings, manufacture and shipment of items to job site in sufficient time to prevent delay in the construction schedule.

3.12.5.3 It shall also be the responsibility of the Contractor to coordinate the preparation of Shop Drawings of items which will be furnished by more than one manufacturer but are designed to interface when installed.

3.12.5.4 If and when required by the Architect/Engineer, the Contractor shall prepare and submit in triplicate to the Architect/Engineer a completely itemized Schedule of Shop Drawings, brochures and other descriptive literature, listing each and all such items as required under these specifications, which schedule shall indicate for each required item:

- **.1** Identification as to pertinent Specification Division.
- **.2** Item(s) involved.
- **.3** Name of pertinent Subcontractor or supplier and the name of pertinent manufacturer.
- **.4** Scheduled date of delivery of pertinent items to the project.

3.12.5.5 The Contractor shall require all Subcontractors to submit to the Architect/Engineer through the Contractor complete brochures covering all materials and/or equipment proposed for use in the execution of the Work as required by their respective Divisions of the Specifications. These brochures shall be indexed and properly cross-referenced to the plans and specifications for easy identification.

3.12.5.6 A list of all materials and equipment, together with manufacturers' drawings and catalog information shall be submitted to the Architect/Engineer for approval prior to ordering material or equipment but not later than **thirty (30)** days after the date of the Notice to Proceed. Information submitted shall show the capacity, operating conditions and all engineering data and descriptive information. The Architect/Engineer's approval will not relieve the Contractor of the responsibility for performance of any terms of the Contract Documents.

3.12.6 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect/Engineer. Such Work shall be in accordance with approved submittals.

3.12.7 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.7.1 Shop Drawings submitted to the Architect/Engineer for approval shall first be checked and approved by the Contractor, the evidence of which shall be a "checked" stamp marked "Approved", or "Approved as Noted" on each copy of each Shop Drawing, placed thereon by the Contractor. Shop Drawings received without the Contractor's "checked" stamp will be cause for immediate return without further action. Each drawing correctly submitted will be checked by the Architect/Engineer and marked "Approved" or "Not Approved".

3.12.7.2 Resubmittals necessitated by required corrections due to Contractor's errors or omissions shall not be cause for extension of Contract Time.

3.12.7.3 At no time shall Shop Drawings which have not been approved by the Architect/Engineer be allowed on the site.

3.12.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect/Engineer's approval of Shop Drawings, Project Data, Samples or similar submittals unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of submittal and the Architect/Engineer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect/Engineer's approval thereof.

3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect/Engineer on previous submittals.

3.12.10 Informational submittals upon which the Architect/Engineer is not expected to take responsive action may be so identified in the Contract Documents.

3.13 USE OF SITE

3.13.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.14 CUTTING AND PATCHING

3.14.1 The Contractor shall by responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.14.3 Existing structures and facilities, including but not limited to buildings, utilities, topography, streets, curbs, walks, landscape materials, and other improvements that are damaged or removed due to required excavations or Contractor's Work, shall be patched, repaired, or replaced by the Contractor to the satisfaction of the Architect/Engineer, the owner of such structures and facilities, and authorities having jurisdiction. In the event that local authorities having jurisdiction require that such repairing and patching be done with their own labor and materials, the Contractor shall abide by such regulations and pay for such work.

3.15 CLEANING UP

3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.

Removal and disposal of all debris, waste materials, or rubbish due to demolition and construction, including clean up and trash removal is required to comply with all applicable ordinances, in the County where the construction site is located, that effect the disposal of solid wastes in the County including use of County franchise collection companies.

3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

3.16 ACCESS TO WORK

3.16.1 The Contractor shall provide the Owner and Architect/Engineer access to the Work in preparation and progress wherever located.

3.17 ROYALTIES AND PATENTS

3.17.1 The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the Owner and Architect/Engineer harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contractor Documents. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect/Engineer.

3.18 INDEMNIFICATION

3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect/Engineer, Architect/Engineer's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees and court costs, arising out of or resulting from performance or non-performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this **Paragraph 3.18** (Indemnification) herein.

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

3.18.3 The obligations of the Contractor under this **Paragraph 3.18** (Indemnification) shall not extend to the liability of the Architect/Engineer, the Architect/Engineer's consultants, and agents and employees of any of them arising out of: (1). the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications, or (2). the giving of or the failure to give directions or instructions

by the Architect/Engineer, the Architect/Engineer's consultants, and agents and employees of any of them provided such giving or failure to give is the primary cause of the injury or damage.

3.18.4 Prior to commencing any excavation or grading the Contractor shall become satisfied as to the accuracy of all survey data as indicated in the Contract Documents and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the survey data, the Contractor shall immediately notify the Architect/Engineer in writing in order that proper adjustments can be made. Commencement by the Contractor of any excavation or grading shall be held as an acceptance of the survey data by the Contractor after which time the Contractor has no claims against the Owner resulting from alleged errors, omissions or inaccuracies of the said survey data except for conditions as described in **Subparagraph 4.3.6** (Claims for Concealed or Unknown Conditions) herein.

3.18.5 The Contractor acknowledges that ten dollars has been included in the Contractor's base bid, which represents the cost to the Owner for the provision of the indemnification required in accordance with this **Paragraph 3.18** (Indemnification) herein.

3.18.6 The Contractor agrees that, upon receiving award of the Contract for construction, the Contractor will execute and deliver to the Owner an Assignment of Antitrust Claims per Section H of the USF Project Manual.

3.18.7 The Contractor also agrees that prior to final payment, the Contractor will cause each of his suppliers and Subcontractors who have furnished services, goods or materials in connection with the performance of the Work to execute and deliver to the Owner an Assignment of Antitrust Claims in the same form as specified above.

3.19 SUBSTITUTIONS

3.19.1 Substitutions for a specified system, product or material may be requested of the Architect/Engineer, and the Architect/Engineer's written approval must be issued as an addendum before substitutions will be allowed. All requests for substitutions must be submitted prior to the opening of bids, and approvals shall be granted no less than seven (7) days prior to the bid date. Substitutions requested after that date will receive no consideration. Substitutions are changes in materials, equipment, methods or sequences or construction, design, structural systems, mechanical, electrical, air conditioning controls, or other requirements of the Drawings or the Specifications.

3.19.2 In substituting materials or equipment, the Contractor assumes responsibility for any changes in systems or for modifications required in adjacent or related work to accommodate such substitution, despite the Architect/Engineer approval, and all costs growing out of the approval shall be the responsibility of the Contractor. None of the extra costs resulting from such approval shall devolve upon the Owner, the Architect/Engineer or other contractors. The Architect/Engineer will be responsible for all architectural or engineering revisions to the drawings and shall be reimbursed by the Contractor for the costs of effecting such revisions.

3.19.3 In making requests for substitutions the Contractor shall list the particular system, product, or material for which a substitution is requested and the justification for such request. Requests submitted shall include any and all adjustments required by the substitution and any other Work affected thereby. The Architect/Engineer may reject a substitution for material reasons or the rejections may be based on aesthetics for which the Architect/Engineer shall be the sole judge.

ARTICLE 4 ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT/ENGINEER

4.1.1 The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Engineer is the person lawfully licensed to practice engineering or an entity lawfully practicing engineering identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect/Engineer" means the Architect or the Engineer or the authorized representative of either.

4.1.2 In case of termination of employment of the Architect/Engineer, the Owner shall appoint an architect or an engineer whose status under the Contract Documents shall be that of the former Architect/Engineer.

4.2 ARCHITECT/ENGINEER'S ADMINISTRATION OF THE CONTRACT

4.2.1 The Architect/Engineer will provide administration of the Contract as described in the Contract Documents, and will be the Owner's representative (1). during construction, (2). until final payment is made and (3). with the Owner's concurrence, from time to time during the correction period described in **Paragraph 12.2** (Correction of Work) herein. The Architect/Engineer will advise and consult with the Owner. The Architect/Engineer will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument in accordance with other provisions of the Contract.

4.2.2 The Architect/Engineer will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check quality or quantity of the Work. On the basis of on-site observations as an architect or as an engineer, the Architect/Engineer will keep the Owner informed of progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work.

4.2.3 The Architect/Engineer will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in **Paragraph 3.3** (Supervision and Construction Procedures) herein. The Architect/Engineer will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect/Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

4.2.4 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate through the Architect/Engineer. Communications by and with the Architect/Engineer's consultants shall be through the Architect/Engineer. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

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

4.2.5.1 The authorized representatives and agents of the Architect/Engineer, Owner, and such other persons as the Owner may designate shall have access to and be permitted to inspect all Work, subcontracts, materials, payrolls, records of personnel, invoices of materials and other relevant data and records wherever they are in preparation and progress. The Contractor shall provide proper facilities for such access and inspection and, when required, exact duplicate copies of the aforementioned data shall be furnished.

4.2.6 The Architect/Engineer will have authority to reject Work which does not conform to the Contract Documents. Whenever the Architect/Engineer considers it necessary or advisable for implementation of the intent of the Contract Documents, the Architect/Engineer will have authority to require additional inspection or testing of the Work in accordance with **Subparagraphs 13.5.2** (Additional Testing and Inspections) and **13.5.3** (Contractor's Costs) herein, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect/Engineer nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect/Engineer to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

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

4.2.8 The Architect/Engineer will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in **Paragraph 7.4** (Minor Changes in the Work) herein.

4.2.9 The Architect/Engineer will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner for the Owner's review and records written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

4.2.10 If the Owner and Architect/Engineer agree, the Architect/Engineer will provide one or more project representatives to assist in carrying out the Architect/Engineer's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in **Subparagraphs 4.2.10.1** and **4.2.10.2** (Project Representative) herein.

4.2.10.1 The Architect/Engineer's Project Representative(s) will:

- **.1** Assist the Contractor in obtaining interpretation of the Contract Documents from the Architect/Engineer.
- **.2** Conduct daily on-site observations for determining conformance to the Contract Documents in regard to Work, materials and equipment, etc.
- **.3** Request additional detail and/or information from the Architect/Engineer when needed by the Contractor.
- **.4** Evaluate suggestions and/or modifications submitted by the Contractor and transmit these to the Architect/Engineer with recommendations.
- **.5** Observe problems which may create delays in construction and report these to the Architect/Engineer.
- **.6** Maintain official relationship only with the Contractor and his job superintendent(s) regardless of which Subcontractor's Work is involved.
- **.7** Attend all required construction conferences and participate in discussions of the Work.
- **.8** Maintain a daily log of Work activity including but not limited to: hours on the job site, weather conditions, daily construction activity, number of men in each trade on the site, with specific identification of ongoing Certified Business Enterprises (**CBE**) activities, general observations, written directives to the Contractor, and visitors.
- **.9** If, upon inspections or observations, Work is found not to be in accordance with Contract Documents, advise Contractor verbally and in writing, that the Work is not in accordance with the Contract Documents. Consult with Architect/Engineer for further directions if the Contractor refuses to correct the Work.
- **.10** Observe and record that tests and inspections required to be performed by others, in addition to those performed by Architect/Engineer's representative and/or the Architect/Engineer, are actually performed, in accordance with the Contract Documents.
- **.11** When requested by the Owner, accompany all state and federal officials on inspections of construction and record the inspection in the log.

.12 Cooperate with university's authorized representative and provide the representative with all required information about the Work.
.13 Accept no directions or instructions from anyone other than the Architect/Engineer.
.14 Maintain in an orderly manner, files of correspondence, reports of job conferences, shop drawings and samples, copies of Contract Documents, change orders, addenda, supplemental drawings, and job log.
.15 Review Applications for Payment submitted by Contractor and recommend to the Architect/Engineer for appropriate action.
.16 Participate in the observations of construction with the Architect/Engineer and the university's authorized representative at regular intervals and at Substantial Completion.
.17 Refer all communications from university's authorized representative to the Architect/Engineer.
.18 Copy university's authorized representative on all correspondence related to the Project.
.19 Review plans, specifications and approved shop drawings on a regular basis. Advise the Architect/Engineer immediately upon discovery of any errors and omissions in the Contract Documents, or of construction problems.
.20 Advise Contractor and Architect/Engineer of Work being performed without approved shop drawings when such shop drawings are required by specifications.
.21 Check materials and equipment delivered to the job site against specifications, approved samples, shop drawings and related correspondence. When observed to be in conflict, advise Contractor and Architect/Engineer.
.22 Check that Contractor is maintaining record drawings of as-built conditions, from which contract record sets are to be developed.
.23 Act as liaison between the Contractor and the university's authorized representative in the coordination of the Contractor's schedule and the University's requirements.
.24 Provide such other services as may be required in the Owner's or Architect/Engineer's interests or in the advancement of the Work.

4.2.10.2 The Architect/Engineer's Project Representative is not authorized to do the following:

.1 Authorize deviations from the Contractor Documents (unless approved in writing by Architect/Engineer).
.2 Expedite the Work for the Contractor.
.3 Advise the Contractor on building techniques or scheduling.
.4 Approve Shop Drawings.
.5 Issue Certifications for Payment.
.6 Approve Substitutions.
.7 Get involved in disputes or problems between Subcontractor and Sub-subcontractor.
.8 Get involved in disputes or problems between Contractor and Subcontractor.
.9 Offer advice to Contractor or Subcontractors on how to perform the Work whether solicited from the Contractor or not.
.10 Shut down the job except in extreme emergencies and except under certain conditions as authorized by the Architect/Engineer.

4.2.11 The Architect/Engineer will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect/Engineer's response to such requests will be made within fifteen (**15**) days after written request is made for them.

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

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

4.3 CLAIMS AND DISPUTES

4.3.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

4.3.2 Decision of Architect/Engineer. Claims, including those alleging an error or omission by the Architect/Engineer, shall be referred initially to the Architect/Engineer for action as provided in **Paragraph 4.4** (Resolution of Claims and Disputes) herein. A decision by the Architect/Engineer, as provided in **Subparagraph 4.4.4** herein, shall be required as a condition precedent to litigation of a Claim between the Contractor and Owner as to all such matters arising prior to the date final payment is due, regardless of (1). whether such matters relate to execution and progress of the Work or (2). the extent to which the Work has been completed. The decision by the Architect/Engineer in response to a Claim shall not be a condition precedent to litigation in the event (1). the position of Architect/Engineer is vacant, (2). the Architect/Engineer has not received evidence or has failed to render a decision within agreed time limits, (3). the Architect/Engineer has failed to take action required under **Subparagraph 4.4.4** herein, within thirty (30) days after the Claim is made, or forty-five (45) days have passed after the Claim has been referred to the Architect/Engineer.

4.3.3 Time Limits on Claims. Claims by either party must be made within twenty-one (21) days after occurrence of the event giving rise to such Claim or within twenty-one (21) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Charge Order will not be considered unless submitted within the time limits provided in this **Subparagraph 4.3.3** (Time Limits on Claims) herein.

4.3.4 Continuing Contract Performance. Pending final resolution of a Claim including litigation, unless otherwise agreed in writing the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

4.3.5 Waiver of Claims: Final Payment. The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

- **.1** Claims, security interest or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.
- **.4** damages including attorneys' fees and costs incurred by the Owner resulting from lawsuits brought against the Owner, the Architect/Engineer or their agents, employees or representatives because of acts or omissions on the part of the Contractor, any Subcontractor, or any of their employees, agents or representatives.

4.3.6 Claims for Concealed or Unknown Conditions. If conditions are encountered at the site which are (1). subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2). unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than twenty-one (21) days after first observance of the conditions. The Architect/Engineer will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect/Engineer determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect/Engineer shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within twenty-one (21) days after the Architect/Engineer has given notice of the decision. If the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect/Engineer for initial determination, subject to further proceedings pursuant to **Paragraph 4.4** (Resolution of Claims and Disputes) herein.

4.3.7 Claims for Additional Cost. If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under **Paragraph 10.3** (Emergencies) herein. If the Contractor believes additional cost is involved for reasons including but not limited to (1). a written interpretation from the Architect/Engineer, (2). an order by the Owner to stop the Work where the Contractor was not at fault, (3). a written order for a minor change in the Work issued by the Architect/Engineer, (4). failure of payment by the Owner, (5). termination of the Contract by the Owner, (6). Owner's suspension or (7). other reasonable grounds, Claim shall be filed in accordance with the procedure established herein.

4.3.8 Claims for Additional Time

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

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

4.3.9 Injury or Damage to Person or Property. If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, of any of the other party's employees or agents, or of others for whose acts such party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding twenty-one (21) days after first observance. The notice shall provide sufficient detail to enable the other party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided in **Subparagraphs 4.3.7** (Claims for Additional Costs) or **4.3.8** (Claims for Additional Time) herein.

4.4 RESOLUTION OF CLAIMS AND DISPUTES

4.4.1 The Architect/Engineer will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1). request additional supporting data from the claimant, (2). submit a schedule to the parties indicating when the Architect/Engineer expects to take actions, (3). reject the Claim in whole or in part, stating reasons for rejection, (4). recommend approval of the Claim by the other party or (5). suggest a compromise. The Architect/Engineer may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

4.4.2 If a Claim has been resolved, the Architect/Engineer will prepare or obtain appropriate documentation.

4.4.3 If a Claim has not been resolved, the party making the Claim shall, within ten days after the Architect/Engineer's preliminary response, take one or more of the following actions: (1). submit additional supporting data requested by the Architect/Engineer, (2). modify the initial Claim or (3). notify the Architect/Engineer that the initial Claim stands.

4.4.4 If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Architect/Engineer, the Architect/Engineer will notify the parties in writing that the Architect/Engineer's decision will be made within seven days, which decision shall be final and binding on the parties but subject to resolution as provided in **Paragraph 4.5**, (Legal Recourses) herein. Upon expiration of such time period, the Architect/Engineer will render to the parties the Architect/Engineer's written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor's default, the Architect/Engineer may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

4.5 LEGAL RECOURSE

4.5.1 The finding of the Architect/Engineer shall be a required condition precedent to further action by the Owner or Contractor as follows:

.1 Claims of one-hundred-thousand dollars ($100,000.00) or less in value shall be conducted pursuant to and under the procedures of the **Chapter 120** (Administrative Procedures Act), Florida Statutes;

.2 All other claims, disputes and other matters not governed by the foregoing shall be determined under the judiciary system of the State of Florida.

The **Chapter 558** (Construction Defects), Florida Statutes, contains important requirements you must follow before you may bring any legal action for an alleged construction defect. Sixty (60) days before you bring any legal action, you must deliver to the other party to this contract a written notice, referring to **Chapter 558**, Florida Statues of any construction conditions you allege are defective and provide such person the opportunity to inspect the alleged construction defects and to consider making an offer to repair or pay for the alleged construction defects. You are not obligated to accept any offer which may be made. There are strict deadlines and procedures under this Florida law which must be met and followed to protect your interests.

ARTICLE 5 SUBCONTRACTORS

5.1 DEFINITIONS

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

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

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Within thirty (**30**) days after the date of the Notice to Proceed, the Contractor, in compliance with the requirements of the Contract Documents, shall furnish in writing to the Owner and ~~through~~ the Architect/Engineer the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect/Engineer will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect/Engineer, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Architect/Engineer to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect/Engineer has made reasonable and timely objection. The Contractor shall not contract with any subcontractor which does not hold the proper contractor's license as required by the State of Florida. Inclusion of the Subcontractor's name in the list provided in accordance with **Subparagraph 5.2.1** shall constitute a certification by the Contractor that the Subcontractor is properly licensed. Thereafter, by signing the monthly University of South Florida's Certificate of Partial Payment, the Contractor will certify that all Subcontractors providing services for the Work are properly licensed. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.2.3 If the Owner or Architect/Engineer has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect/Engineer has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4 The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect/Engineer makes reasonable objection to such change including, but not limited to, objections related to **CBE** participation.

5.2.5 The Contractor and the Subcontractors shall, within **thirty (30)** days of the date of the Notice to Proceed, provide the names of all major Sub-subcontractors and/or material and equipment manufacturers. The following list is suggested but can be reduced or expanded at the discretion of the Architect/Engineer or as directed by the Owner.

- **.1** landscaping
- **.2** paving contractor (concrete, asphaltic concrete)
- **.3** concrete supplier
- **.4** masonry – concrete/brick
- **.5** structural and miscellaneous iron
- **.6** millwork (architectural)
- **.7** thermal and moisture protection below and above including roof
- **.8** windows, curtainwall, hollow metal doors and frames, hardware
- **.9** floor, wall and ceiling finishes and systems
- **.10** major specialties
- **.11** major equipment
- **.12** furniture, movable screens, fixed seating
- **.13** special construction
- **.14** elevators, escalators
- **.15** plumbing fixtures, special piping, traps, sumps, etc., mechanical equipment, monitoring and automation controls, etc.
- **.16** electrical fixtures, controllers, switchgears, devices, transformers, etc.

5.2.6 The Contractor understands and agrees that the Contractor alone is responsible to the Owner for all of the Work under the Contract and that any review of Subcontractors or Sub-subcontractors by the Owner or Architect/Engineer will not in any way make the Owner responsible to any Subcontractor or Sub-subcontractor, nor will it make the Owner responsible for the actions or omissions of any Subcontractor or Sub-subcontractor.

5.3 SUBCONTRACTUAL RELATIONS

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

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

- **.1** assignment is effective only after termination of the Contract by the Owner for cause pursuant to **Paragraph 14.2** (Termination by the Owner for Cause) herein, and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor in writing; and

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided elsewhere in the Contract Documents.

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

6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

6.2 Mutual Responsibility

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

6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect/Engineer apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

6.2.3 Costs caused by delays or by improperly timed activities or defective construction shall be borne by the party responsible therefor.

6.2.4 The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in **Subparagraph 10.2.5** (Prompt Remedy) herein.

6.2.5 Claims and other disputes and matters in question between the Contractor and a separate contractor shall be subject to the provisions of **Paragraph 4.3** (Claims and Disputes) herein, provided the separate contractor has reciprocal obligations.

6.2.6 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in **Paragraph 3.14** (Cutting and Patching) herein.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish as described in **Paragraph 3.15** (Cleaning Up) herein, the Owner may clean up and allocate the cost among those responsible as the Architect/Engineer determines to be just.

ARTICLE 7 CHANGES IN THE WORK

7.1 CHANGES

7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this **Article 7** (Changes in the Work) herein, and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect/Engineer; a Construction Change Directive requires agreement by the Owner and Architect/Engineer and may or may not be agreed to be the Contractor; an order for a minor change in the Work may be issued by the Architect/Engineer as provided in **Paragraph 7.4** (Minor Changes in the Work) herein.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

7.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.2 CHANGE ORDERS

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

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

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in **Subparagraph 7.3.3** (Change Directive) herein.

7.2.3 All Change Orders must be on the University of South Florida Change Order form, included in **Section H** of the Project Manual.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect/Engineer and signed by the Owner and Architect/Engineer, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly. The Construction Change Order Directive form is provided in **Section H** of the Project Manual.

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

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

.1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 a not-to-exceed amount based on unit prices stated in the Contract Documents or subsequently agreed upon;
.3 cost to be determined in a manner agreed upon by the parties and a percentage fee as provided in **Subparagraph 7.3.12** (Overhead & Profit); or

.4 as provided in **Subparagraph 7.3.6** (Adjustment to Contract Sum) herein.

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

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

7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment and the not-to-exceed amount shall be determined by the Architect/Engineer on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, the stipulated allowance for overhead and profit as stated in **Subparagraph 7.3.12** (Overhead and Profit) herein. In such case, and also under **Subparagraph 7.3.3.3** (Determining Costs) herein, the Contractor shall keep and present, in such form as the Architect/Engineer may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this **Subparagraph 7.3.6** (Adjustments to Contract Sum) herein, shall be limited to the following:

.1 costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' or workmen's compensation insurance;
.2 costs of materials, supplies and equipment, including sales tax and cost of transportation, whether incorporated or consumed;
.3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
.5 additional costs of supervision and field office personnel directly attributable to the change.

7.3.7 Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect/Engineer. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.8 If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect/Engineer for determination.

7.3.9 When the Owner and Contractor agree with the determination made by the Architect/Engineer concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

7.3.10 The Cost of the Change shall not include any of the following items:

.1 Salaries or other compensation of the Contractor's personnel at the Contractor's offices, including the field office, unless direct additional expense has been incurred exclusively because of the change;
.2 Expenses of the Contractor's offices, including the field office;
.3 Any part of the Contractor's capital expenses, including interest on the Contractor's capital;
.4 Costs due to the negligence of the Contractor, any Subcontractor, and Sub-subcontractor, anyone directly or indirectly employed by any of them, or for whose acts any of them may be liable, including, but not limited to, the correction of defective or nonconforming Work, disposal of materials and equipment wrongly supplied, or making good any damage to property; or,

.5 Overhead, general expense, and the cost of any item not specifically or reasonably inferable as included in the items described in **Subparagraph 7.3.6** (Adjustments to Contract Sum) herein.

7.3.11 The Contractor shall check all materials, equipment and labor entering into the Work as a result of changes in the Work and shall keep such full and detailed accounts as may be necessary for proper financial management under the Contract, and the system shall be satisfactory to the Owner. The Owner shall be afforded access to all the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to changes in the Contract.

7.3.12 The percentage fee for overhead and profit combined, to be added to the cost of the change in determining the total cost to the Owner, shall be negotiated based upon the following schedule:

.1 For any work performed by the Contractor's own forces, a maximum of fifteen percent (15%) of the cost of the change;

.2 For any work performed by a Subcontractor or forces under the Subcontractor including any Sub-subcontractors or other persons not in the direct employ of the Subcontractor, a maximum total of twenty-two and one half percent (22.5%) of the cost of the change, with a maximum of fifteen percent (15%) to be assigned to the Subcontractor and any forces under him and a maximum of seven and one-half percent (7.5%) to be assigned to the Contractor.

7.3.13 If a change in the Work results in a credit to the Owner, the credit shall be the net Cost of the Charge as defined in **Subparagraphs 7.3.6** Adjustments to Contract Sum) and **7.3.10** (Cost of Change) herein, and shall not include any allowance for the Contractor's or Subcontractors' overhead and profit.

7.4 MINOR CHANGES IN THE WORK

7.4.1 The Architect/Engineer will have authority, after receiving the Owner's approval, to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

ARTICLE 8 TIME

8.1 DEFINITIONS

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

8.1.2 The date of commencement of the Work is the date established in the notice to proceed. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible.

8.1.3 The date of Substantial Completion is the date certified by the Architect/Engineer in accordance with **Paragraph 9.8** (Substantial Completion) herein.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

8.2 PROGRESS AND COMPLETION

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

8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by **Article 11** (Insurance and Bonds) herein, to be furnished by the Contractor. The date of commencement of the Work shall not be changed by the effective date of such insurance.

8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 If the Contractor is delayed at any time in progress of the Work by an act or neglect of the Owner or Architect/Engineer, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending resolution of Claims or other matters in question, or by other causes which the Architect/Engineer determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect/Engineer may determine.

8.3.2 Claims relating to time shall be made in accordance with applicable provisions of **Paragraph 4.3** (Claims and Deputes) herein.

8.3.3 This **Paragraph 8.3** herein does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents, except that in instances of delays due to adverse weather conditions and labor disputes, Claims for extended overhead costs will not be allowed.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

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

9.2 SCHEDULE OF VALUES

9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect/Engineer a schedule of values allocated to various portions of the Work, prepared in the form as provided in **Section H** of the Project Manual, and supported by such data to substantiate its accuracy as the Architect/Engineer may require. This schedule, unless objected to by the Architect/Engineer, shall be used as a basis for reviewing the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect/Engineer an itemized preliminary draft of the Application for Payment with complete supporting data on the University of South Florida Certificate of Partial Payment form. Upon approval of the preliminary draft, the Contractor shall submit to the Architect/Engineer the Application for Payment for operations completed in accordance with the schedule of values. Such application shall be notarized and supported by such data substantiating the Contractor's right to payment as the Owner or Architect/Engineer may require, such as copies of requisitions from Subcontractors and materials suppliers, and reflecting retainage. Applications for payments shall be made monthly beginning within 30 days after the notice to proceed.

9.3.1.1 With the exception of Work which may be exempted from this requirement by a provision in the Special Conditions of this Project Manual, retainage shall be withheld from each monthly payment request, in an amount not to exceed ten percent (10%) of the approved payment until fifty percent (50%) of construction payments are made. After the Work is considered to be fifty percent (50%) complete, retainage thereafter not to exceed ten percent (10%) of the request, may or may not be withheld at the discretion of the Owner.

Withholding of the retainage shall be subject to the provisions of the **Paragraph 6.3** (Payments Withheld) and **Subparagraph 6.3.1.2** of the Owner Contractor Agreement.

9.3.1.2 If securities are substituted in lieu of retainage as permitted by **Section 255.052** (Substitution of Securities for Retainage), Florida Statues, the securities must be free of all encumbrances, and the Contractor must assign all its rights to the securities to the Owner, enabling the Owner to use those securities as it would retainage.

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work.

If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

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

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect/Engineer will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect/Engineer determines is properly due, or notify the Contractor and Owner in writing of the Architect/Engineer's reasons for withholding certification in whole or in part as provided in **Subparagraph 9.5.1** (Withholding Certification) herein.

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

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1 The Architect/Engineer may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect/Engineer's opinion the representations to the Owner required by **Subparagraph 9.4.2** (Certificate for Payment) herein cannot be made. If the Architect/Engineer is unable to certify payment in the amount of the Application, the Architect/Engineer will notify the Contractor and Owner as provided in **Subparagraph 9.4.1** herein. If the Contractor and Architect/Engineer cannot agree on a revised amount, the Architect/Engineer will promptly issue a Certificate for Payment for the amount for which the Architect/Engineer is able to make such representations to the Owner. The Architect/Engineer may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect/Engineer's opinion to protect the Owner from loss because of, but not limited to:

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or another contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 persistent failure to carry out the Work in accordance with the Contract Documents.

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

9.6 PROGRESS PAYMENTS

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

9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. When the Contractor receives payment from the Owner for labor, services or materials furnished by subcontractors and suppliers hired by the Contractor for the project, the Contractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract, within ten (10) days after the Contractor's receipt of payment from the Owner. When the payment due the subcontractor is for final payment, including retainage, the subcontractor must include with the invoice for final payment a conditional release of lien and all appropriate warranties and closeout documentation. When the subcontractor receives payment from the Contractor for labor, services or materials furnished by subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract, within ten (10) days after the subcontractor's receipt of payment.

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

9.6.4 Neither the Owner nor Architect/Engineer shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

9.6.5 Payment to material suppliers shall be treated in a manner similar to that provided in **Subparagraphs 9.6.2**, **9.6.3** and **9.6.4** herein.

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

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect/Engineer does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect/Engineer or awarded by litigation then the Contractor may, upon seven additional days' written notice to the Owner and Architect/Engineer, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, which shall be accomplished as provided in **Article 7** (Changes in the Work) herein.

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the

Architect/Engineer a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Architect/Engineer will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect/Engineer's inspection discloses any item, whether or not included on the Contractor's list, which is not in accordance with the requirements of the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect/Engineer. The Contractor shall then submit a request for another inspection by the Architect/Engineer to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Architect/Engineer will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

9.8.3 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect/Engineer, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents. Liquidated damages to the date of Substantial Completion shall be deducted by Construction Change Directive from the Contract Sum and from the Substantial Completion payment.

9.8.4 The acceptance of Substantial Completion payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the Application for Payment for Substantial Completion, and except for the retainage sums due at final acceptance.

9.8.5 The Contractor shall be responsible for collecting, identifying, indexing and collating the following materials from the Subcontractors, and will deliver four copies of the finished document to the Architect/Engineer to verify completeness. The Architect/Engineer will deliver three copies of the following to the Owner:

.1 Complete equipment diagrams, operating instructions, maintenance manuals, parts lists, wiring diagrams, pneumatic and/or electrical control diagrams, test and balance reports, inspection reports, guarantees and warranties, as applicable, for each and every piece of fixed equipment furnished under this Contract to be supplied in a ring binder, hard-cover book, properly indexed for ready reference. Also, specific information regarding manufacturer's names, addresses, office and home phone numbers, make and model numbers, operating design and characteristics, etc., will be required. All information submitted shall be current as of the time of submission.

9.8.6 Subsequent to the time of Substantial Completion and receipt of contract record sets and operations and maintenance books, but prior to the date of final acceptance, the Contractor and/or Subcontractor shall provide a competent and experienced person (or persons) thoroughly familiar with the Work for a reasonable period of time but not less than forty (40) hours to instruct the Owner's personnel in operation and maintenance of equipment and control systems. This instruction will include normal start-up, run, stop, and emergency operations, location and operation of all controls, alarms and alarm systems, etc. This instruction will include tracing the system in the field and on the diagrams in the instruction booklets so that operating personnel will be thoroughly familiar with both the system and the data supplied.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under **Paragraph 11.3** (Property Insurance) herein, and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and

Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect/Engineer as provided under **Subparagraph 9.8.2** (Substantial Completion) herein. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect/Engineer.

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

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

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect/Engineer will promptly make such inspection and, when the Architect/Engineer finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect/Engineer will promptly issue a final Certificate for Payment stating that to the best of the Architect/Engineer's knowledge, information and belief, and on the basis of the Architect/Engineer's observations and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in said final Certificate is due and payable. The Architect/Engineer's final Certificate for Payment will constitute a further representation that conditions listed in **Subparagraph 9.10.2** herein, as precedent to the Contractor's being entitled to final payment have been fulfilled. Liquidated damages assessed subsequent to Substantial Completion shall be deducted by Construction Change Directive from the Contract Sum and from the final payment.

9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect/Engineer (1). an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2). a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be cancelled or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner, (3). a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4). consent of surety (**UPM-Exhibit F-4**), if any, to final payment and (5). if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such claim. If such claim remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such claim, including all costs and reasonable attorneys' fees.

9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect/Engineer so confirms, the Owner shall, upon application by the Contractor and certification by the Architect/Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect/Engineer prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims. The making of final payment shall constitute a waiver of claims by the Owner as provided in **Subparagraph 4.3.5** (Waiver of Claims) herein.

9.10.4 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment. Such waivers shall be in addition to the waiver described in **Subparagraph 4.3.5** herein.

9.10.5 The Contractor's application for final payment shall be accompanied by a completed and notarized "Certificate of Contract Completion" as provided in **Section H of the USF Project Manual**. Any items required by the Contract Documents not previously submitted shall accompany the application for final payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

10.1.2 Unless asbestos abatement is specifically included as part of the Work elsewhere in the Contract Documents, then in the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect/Engineer in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect/Engineer on which legal recourse has not been demanded, or by legal recourse under **Article 4** (Administration of the Contract) herein.

10.1.2.1 The Contractor shall be responsible to insure that Asbestos Containing Materials (ACM) are not incorporated in the scope of work for the project. The Contractor shall provide Material Safety Data Sheets for all products and materials for the project and shall certify that Asbestos Containing Materials have not been incorporated in the scope of work.

10.1.2.2 The Contractor shall be responsible for notification of the proper agencies, and for the cost of the removal, encapsulation, transportation and disposal of any hazardous material, including, without limitation, any asbestos or asbestos-related products as substitutions per **Paragraph 3.19** (Substitutions) in connection with the Work. Hazardous material, described by Federal guidelines brought by the Contractor or the Subcontractors shall remain their responsibility for proper disposal. Any hazardous material on the site prior to proceeding with the work and not specifically shown on the documents shall be considered a concealed condition.

10.1.2.3 Any hazardous material removal including asbestos abatement Work required in connection with the Work shall only be performed by an approved Contractor for asbestos, etc., which has been pre-qualified by the Owner.

10.1.3 The Contractor shall not be required pursuant to **Article 7** (Changes in the Work) herein, to perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB).

10.2 SAFETY OF PERSONS AND PROPERTY

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

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

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

10.2.2 The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

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

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

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in **Subparagraphs 10.2.1** (Safety of Persons and Property) and **10.2.1.2** herein, caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under **Subparagraphs 10.2.1.2** and **10.2.1.3** herein. except damage or loss attributable to acts or omissions of the Owner or Architect/Engineer or anyone directly or indirectly employed by either of them, or by anyone for whose act either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligation under **Paragraph 3.18** (Indemnification) herein.

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

10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.3 EMERGENCIES

10.3.1 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in **Paragraph 4.3 (**Claims and Disputes) and **Article 7** (Changes in the Work) herein.

ARTICLE 11 INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in Florida such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable~~:~~. All insurance policies shall be issued and countersigned by representatives of such companies duly authorized for the State of Florida and shall be written on Insurance Services Office, Inc. (ISO) standard forms or their equivalents. The Contractor shall provide the ISO Commercial General Liability policy for general liability coverages. All liability policies shall provide that the Owner is a named additional insured as to the operations of the Contractor under the Agreement and shall provide the Severability of Insured's Provision. The Owner shall be exempt from, and in no way liable for, any sums of money which may represent a deductible in any insurance policy. The payment of such deductible shall be the responsibility solely of the Contractor and/or Subcontractor providing such insurance. This insurance shall protect the Contractor from the following claims:

.1 claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;

.2 claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 claims for damages insured by usual personal injury liability coverage including claims which are sustained (1). by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2). by another person;

.5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle; and

.7 claims involving contractual liability insurance applicable to the Contractor's obligations under **Paragraph 3.18** (Indemnification) herein.

11.1.2 The insurance required by **Subparagraph 11.1.1** herein, shall be written for not less than limits of five-hundred-thousand dollars ($500,000.00) per person, one-million dollars ($1,000,000.00) per occurrence or a minimum of one-million dollars ($1,000,000.00) combined single limit. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment. The insurance required by **Subparagraph 11.1.1** herein, shall include contractual liability insurance applicable to the Contractor's obligations under **Paragraph 3.18** (Indemnification) herein, and coverage for the "XCU" exposure.

The University of South Florida, Board of Trustees shall be named as an additional insured and a waiver of subrogation in favor of the Owner shall be included in all liability policies.

11.1.2.1 Worker's Compensation: The Contractor shall secure and maintain for the life of this Agreement, valid Worker's Compensation Insurance as required by **Chapter 440** (Worker's Compensation), Florida Statutes. Copies of the insurance policy shall be filed with the Owner no later than sixty (**60**) days after execution of the Owner-Contractor Agreement.

11.1.2.2 Automobile Liability: The Contractor shall secure and maintain, during the life of this Agreement, Automobile Liability insurance on all vehicles against bodily injury and property damage in at least the amounts of five-hundred-thousand dollars ($500,000.00) per person, one-million dollars ($1,000,000.00) per occurrence and property damage in at least the amount of five-hundred-thousand dollars ($500,000.00); or combined single limit of one-million dollars ($1,000,000.00) for bodily injury and property damage. The University of South Florida, Board of Trustees shall be named as an additional insured and a waiver of subrogation in favor of the Owner shall be included in all liability policies.

11.1.3 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These Certificates and the insurance policies required by this **Paragraph 11.1** (Contractor's Liability Insurance) herein, shall contain a provision that coverages afforded under the policies will not be cancelled or allowed to expire until at least thirty (30) days' prior to written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by **Subparagraph 9.10.2** (Final Payment) herein. The Contractor shall furnish one copy each of Certificates of Insurance for each copy of the Agreement which shall specifically set forth evidence of all insurance coverage required by the Contract Documents. The Certificate of Insurance shall be dated and show the name of the insured Contractor, the specific job by name and job number, the name of the insurer, the number of the policy, its effective date, and its termination date. The Contractor shall furnish a copy of the insurance policy to the Owner within **thirty (30)** days following execution of the Agreement.

11.2 OWNER'S LIABILITY INSURANCE

11.3 PROPERTY INSURANCE

11.3.1 The Contractor shall purchase and maintain, with an admitted carrier in the State of Florida, property insurance in the amount of the initial Contract Sum as well as subsequent modifications thereto for the entire Work at the site on a replacement cost basis, including, where applicable, the existing structure. Coverage for existing structures shall include all perils described in **Subparagraph 11.3.1.1** below. Such property insurance (builder's risk) shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in **Paragraph 9.10** (Final Completion and Final Payment) or until no person or entity other than the Owner has an insurable interest in the property required by this **Paragraph 11.3** (Property Insurance), herein to be covered, whichever is earlier. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.3.1.1 Property insurance shall be written on a Builder's Risk form or its equivalent and shall include coverage on a replacement value basis. Property covered by this insurance shall include property of the Owner, Contractor, Subcontractors and Sub-subcontractors, consisting of materials, supplies, machinery, equipment and fixtures which will become a permanent part of the Work at the project site. Property covered by this insurance shall also include temporary building(s) or structure(s) at the site other than office trailer(s). The perils insured under this insurance shall be at least equivalent to the insured perils of the Causes of Loss – Special form as published by the Insurance Services Office, Inc. including reasonable compensation for Architect/Engineer's services and expenses required as a result of such insured loss.

11.3.1.2 Any special insurance requirements will be addressed in the Special Conditions or in Supplementary Conditions.

11.3.1.3 If the property insurance provides deductibles, the Contractor shall pay costs not covered because of such deductibles, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the Owner and the Contractor.

11.3.1.4 Unless otherwise provided in the Contract Documents, this property insurance shall cover portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also portions of the Work in transit.

11.3.2 Boiler and Machinery Insurance. When the Work includes the repair, removal, installation and/or testing of live steam boilers, valves, pipes or lines, then this insurance shall include coverage at least equivalent to the Boiler and Machinery Coverage Form as published by the Insurance Services Office, Inc. This insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insured's.

11.3.3 Prior to commencement of the Work, the Contractor shall provide the Owner with a Certificate of Insurance which evidences the property insurance (builder's risk) provided by the Contractor. This Certificate of Insurance shall include an Additional Named Insured Provision and a Waiver of Subrogation Provision in favor of the Owner to protect the interests of the Owner. Upon receipt of the policy, the Contractor shall file with the Owner a copy of each policy that includes insurance coverages required by this **Paragraph 11.3** (Property Insurance) herein. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least thirty (**30**) days' prior written notice has been given to the Owner.

11.3.4 A loss or losses insured under this insurance shall be adjusted by the Contractor and its insurance company. The Contractor shall repair or replace the damaged property with the proceeds from the builder's risk policy. The Contractor shall be responsible for all damages and necessary repairs whether or not the loss is covered by the builder's risk policy.

11.3.5 Partial occupancy or use in accordance with **Paragraph 9.9** (Partial Occupancy or Use) herein, shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.4 PERFORMANCE BOND AND PAYMENT BOND

11.4.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

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

12.1.2 If a portion of the Work has been covered which the Architect/Engineer has not specifically requested to observe prior to its being covered, the Architect/Engineer may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2 CORRECTION OF WORK

12.2.1 The Contractor shall promptly correct Work rejected by the Architect/Engineer or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect/Engineer's services and expenses made necessary thereby. The Contractor shall commence correction of the Work within seven (7) days after the date of written notice from the Architect/Engineer.

12.2.2 If, within one (1) year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under **Subparagraph 9.9.1** (Owner Occupancy) herein, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation under this **Subparagraph 12.2.2** herein, shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

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

12.2.4 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with **Paragraph 2.4** (Owner's right to Carry Out the Work) herein. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written

notice from the Architect/Engineer, the Owner may remove it and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within ten (10) days after written notice, the Owner may upon ten (10) additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect/Engineer's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

12.2.5 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

12.2.6 Nothing contained in this **Paragraph 12.2** (Correction of Work) herein, shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the time period of one year as described in **Subparagraph 12.2.2** herein, relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

13.1.1 The Contract shall be governed by the law of the State of Florida.

13.2 SUCCESSORS AND ASSIGNS

13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. In case the Contractor, on written consent of the Owner, assigns all or any part of any money due or to become due under this Contract, the instrument of assignment shall contain a Subparagraph substantially to the effect that it is agreed that the right of the assignee to any money due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract.

13.3 WRITTEN NOTICE

13.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

13.4 RIGHTS AND REMEDIES

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

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

13.5 TESTS AND INSPECTIONS

13.5.1 Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or order of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect/Engineer timely notice of when and where tests and inspections are to be made so the Architect/Engineer may observe such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

13.5.2 If the Architect/Engineer, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under **Subparagraph 13.5.1** herein, the Architect/Engineer will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect/Engineer of when and where tests and inspections are to be made so the Architect/Engineer may observe such procedures. The Owner shall bear such costs except as provided in **Subparagraph 13.5.3** herein.

13.5.3 If such procedures for testing, inspection or approval under **Subparagraphs 13.5.1** and **13.5.2** herein reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect/Engineer's services and expenses.

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

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

13.5.6 Test or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.5.7 Where tests are required by the technical specifications for materials, methods or equipment, the Contractor shall pay the cost of initial tests to prove qualities and determine conformance with specification requirements, e.g., mill tests on cement and steel; load testing of piling; sieve analysis and colorimetric tests on sand; strength tests for determining proportions of materials for concrete, moisture content and sound transmission tests of concrete blocks, etc.

13.5.8 If substitute materials or equipment are proposed by the Contractor, he shall pay the cost of all tests which may be necessary to satisfy the Architect/Engineer that specification requirements are met.

13.5.9 The Contractor shall pay for all testing costs, including but not limited to, power, fuel, and equipment costs which may be required for complete testing of all equipment and systems for proper operation such as plumbing, heating, ventilation, air conditioning, electrical, elevator, dumbwaiters and conveyors, etc.

13.6 INTEREST

13.6.1 Interest shall be paid in certain cases as provided by **Section 215.422** (Payments), Florida Statues.

13.6.2 The Contractor shall be required to pay interest to Subcontractors and suppliers in certain cases where payments are not within the time constraints of **Section 287.0585** (late Payments), Florida Statues.

13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

13.7.1 As between the Owner and Contractor:

.1 Before Substantial Completion. As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and

any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

.2 Between Substantial Completion and Final Certificate for Payment. As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and

.3 After Final Certificate for Payment. As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any warranty provided under **Paragraph 3.5** (Warranty) herein, the date of any correction of the Work or failure to correct the Work by the Contractor under **Paragraph 12.2** (Correction of Work) herein, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

13.8 HARMONY

13.8.1 The Contractor shall exert every reasonable and diligent effort to assure that all labor employed by the Contractor and the Subcontractors for Work on the Project shall Work in harmony with and be compatible with all other labor being used on the site of the Project, and representative of the Architect/Engineer and the Owner.

13.8.2 The Contractor shall include this provision in all contracts with Subcontractors, and the Contractor shall require that such a provision be included in the contracts between the Subcontractors and the Sub-subcontractors, provided, however, that this provision shall not be interpreted or enforced so as to deny or abridge, on account of membership or non-membership in any labor union or labor organization, the right of any person to work as guaranteed by **Article I, Section 6** (Right to Work) of the Florida Constitution.

13.9 CHANGE OF ADDRESS

13.9.1 If the address of the Contractor changes, the Contractor shall provide written notice to that effect to both the Owner and the Architect/Engineer.

13.10 DISCOVERY OF VALUABLE ITEMS OR ITEMS OF HISTORICAL SIGNIFICANCE

13.10 If in the execution of the Work any items of historical significance or any valuable items or materials of any kind are discovered buried or hidden within the Work, such items or materials shall be the property of the Owner. The Contractor shall immediately upon discovery of such items or materials, and before removal thereof, acquaint the Architect/Engineer with such discovery and carry out by Change Order, at the expense of the Owner, the Architect/Engineer's orders as to the disposal of the items or materials.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of thirty (**30**) days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor, for any of the following reasons:

.1 issuance of an order of a court or other public authority having jurisdiction;

.2 an act of government, such as a declaration of national emergency, making material unavailable;

.3 because the Architect/Engineer has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in **Subparagraph 9.4.1** (Certification for Payment) herein, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents;

.4 if repeated suspensions, delays or interruptions by the Owner as described in **Paragraph 14.3** (Suspension of Work for Owner Convenience) herein, constitute in the aggregate more than one-hundred percent (100%) of the total number of days scheduled for completion, or one-hundred-twenty (120) days in any three-hundered-sixty-five (365) day period, whichever is less; or

.5 the Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by **Subparagraph 2.2.1** (Review by Contractor) herein.

14.1.2 If one of the above reasons exists, the Contractor may, upon seven (7) additional day's written notice to the Owner and Architect/Engineer, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 The Owner may terminate the Contract if the Contractor:

.1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractor;
.3 persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or
.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

14.2.2 When any of the above reasons exist, the Owner, upon certification by the Architect/Engineer that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven (7) days' written notice, terminate employment of the Contractor and may direct the surety to:

.1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
.2 accept assignments of subcontracts pursuant to **Paragraph 5.4** (Contingent Assignment of Subcontractors) herein; and
.3 finish the Work by whatever reasonable method the Owner may deem expedient.

14.2.3 When the Owner terminates the Contract for one of the reasons stated in **Subparagraph 14.2.1** (Termination) herein, the Contractor shall not be entitled to receive further payment until the Work is finished.

14.2.4 If the Contractor's surety is directed to complete the Work, then all payments made after termination shall be made to the Surety until the Work is finished and the Contract Sum has been expended. The surety shall then be responsible for all of the obligations and duties of the Contractor under the Contract and shall be bound by the conditions of the Contract to fulfill all obligations of the Contract for the Contract Sum therein. The Surety may not assign those obligations without the written consent of the Owner. The surety shall be responsible for the payment of all costs relating to the termination of the employment of the Contractor, including compensation for the Architect/Engineer's services and expenses made necessary thereby. The amount to be paid to the surety or Owner, as the case may be, shall be certified by the Architect/Engineer, upon application, and this obligation for payment shall survive termination of the employment of the Contractor.

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

14.3.2 An adjustment shall be made for increases in the cost of performance of the Contract including profit on the increased cost of performance, caused by suspension, delay or interruption. No adjustment shall be made to the extent:

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
.2 that an equitable adjustment is made or denied under another provision of the Contract.

14.3.3 Adjustments made in the cost of performance may have a mutually agreed fixed or percentage fee.

SECTION 011100 – Summary of Work

1.1 GENERAL DESCRIPTION

The project shall consist of all material and effort necessary to replace the (2) chilled water air handlers and associated air and water side systems. This work includes removal of the existing ceiling grid system and installation of new. All electrical requirements necessary to complete this work in addition to grounding requirements as described in the electrical drawings.

1.2 WORK BY THE OWNER

A. The Owner may concurrently perform construction work at the project site. The Contractor is required to cooperate fully so as not to interfere with the work performed by the Owner under separate contracts. The work included being performed by the Owner is indicated elsewhere in these construction documents.
B. When required by these documents, schedule and coordinate the work of the Owner's separate Contractors.
C. Unless otherwise specified, the Owner will perform the necessary tasks to vacate work areas in advance of construction, including removal of furniture and equipment except where such work is specified to be performed by the Contractor. The Contractor is to allow three (3) days minimum, or as otherwise indicated in these documents, for Owner move-out at the beginning of each phase of construction. Contractor tasks during this period may not interfere with Owner move-out activities.

1.3 WORK ON OTHER PROJECTS

If work of other projects will be performed simultaneously with the work of this project, the Contractor is expected to cooperate with other contractors and with the Owner to avoid interference with each other's work.

1.4 SCHEDULING THE WORK

Job conditions which will affect phasing and scheduling of the work are described in these documents. Particular attention must be given to remodeling work in buildings which will remain in operation during remodeling. Examples of some problems that may be encountered are:

A. MAINTENANCE OF INGRESS AND EGRESS: Temporary entrances and exits must meet code requirements.
B. SECURITY: Areas which are being operated by the User/Occupant Group, must be secured from the construction area and vice versa.
C. STORAGE: If adequate area is not available for storage of construction materials, adjust delivery schedule accordingly. The location of storage/staging areas on site must be approved by USF Facilities, and must be properly secured by the Contractor, and must be removed upon substantial acceptance.
D. MAINTENANCE OF UTILITIES, LOW VOLTAGE, & OTHER SERVICES: These requirements are set forth in section 01 1400 Work Restrictions and Scheduling.
E. PROTECTION FROM WATER AND MOISTURE: The Contractor is required to take the necessary precautions to avoid water/moisture intrusion into the building during construction, including condensation resulting from failure to maintain the integrity of the building envelope.

1.5 WORK COVERED BY THE CONTRACT DOCUMENTS

A. Project Description: As described in the Contract Documents.

B. Contract Documents: Contract documents are defined in the General Conditions of the Contract; and include the Invitation to Bid (when applicable), the Construction Contract and associated Conditions, the purchase order, the drawings, the specifications, addenda issued prior to bid, and changes issued subsequent to award of the contract.

C. Project Manual: includes the bid requirements and forms, the contracting requirements and the specifications.

E. Type and Form of Contract:
Except as otherwise indicated, all work under this Contract will be under a single prime Contract between the Owner and the Contractor. “Contractor” is used interchangeably to refer to any entity providing construction services under a prime contract, including a General Contractor, Construction Manager at Risk or Design/Build firm.

END OF SECTION 011100

SECTION 011400 WORK RESTRICTIONS AND SCHEDULING

1.1 CONTRACTOR USE OF PREMISES

A. PREMISES: Use of the University's premises by Contractor will be limited to the area identified within the "**Project Limits**" as established within the Construction Documents. Space for staging work and related operations of Contractor and Contractor's employees will be provided, subject to availability. Coordinate use of premises under direction of USF Facilities Management.

B. PROTECTIVE BARRIER: Provide and erect before any work begins, and maintain during the progress of the Work, all necessary protective barriers, warning signals, signs and lights.

C. AREA INSIDE OF CONSTRUCTION FENCE: The area inside of the construction fence is to be maintained by the contractor for the duration of construction and restored to the same or better condition at project completion.
Contractor is responsible to trim along the fence line during construction as needed to maintain a neat appearance.

D. AREA OUTSIDE OF CONSTRUCTION FENCE: Any work that must be done outside of the designated construction area or phase limit in order to accomplish the Work of the Project or Phase of the Project must be prior approved by the USF-Project Manager.

E. WORK HOURS: Contractor will have use of the work area during designated work hours (Monday through Friday 7:00 AM to 5:00 PM unless otherwise noted), Work to be performed outside of designated work hours requires 72 hour prior notice to and approval of the USF-Project Manager.
The Contractor shall not work at the project site on any day the University of South Florida is officially closed, unless the USF-Police Department is made aware of such construction.

F. PRESENCE OF SUPERINTENDENT: Work may be performed and materials may be delivered to the job site only during times when the Construction Superintendent is present on site. The Construction Superintendent is defined as a direct employee of the Contractor. This role may not be delegated to a subcontractor.

G. JOBSITE COMMUNICATIONS: Construction Workers and delivery personnel are prohibited from communicating with staff and students at the work site. All communication is to be routed to the Design Professional or the USF-Project Manager except in the event of an emergency.

1.2 WORK IN OCCUPIED AREAS

A. CAMPUS: The University will occupy the surrounding premises during the entire period of the Work of this Contract to conduct its normal operations. Cooperate with University in all construction operations to minimize conflict, and to facilitate University usage.

B. WORK HOURS IN OCCUPIED AREAS: Work in areas which have not been vacated for construction are to be restored for use by the University prior to 7:00 AM the following weekday.

C. COMMON AREAS: The Contractor will not interrupt access, or interfere with the use of any facility, road, sidewalk, common area or parking area outside of the area of construction, except as permitted by the Owner.

1.3 DISRUPTIVE WORK

A. The Contractor is required to plan the work so to avoid disrupting the University's operations. The Contractor will schedule the work with the input of the USF-Project Manager. USF may require that potentially disruptive activities be performed after hours.

C. Contractor requests to work on weekends and holidays will be accommodated at USF's discretion. Such requests will not be granted solely for the Contractor's convenience.

D. Disruptive activities include those which generate odor, vibration, dust or noise which can be heard in adjacent buildings.

E. The Contractor will not interrupt power, lighting, low voltage systems, safety systems, and plumbing, telephone, or HVAC services in an occupied facility without advance written Owner approval.
F. Where it is not possible to complete certain mechanical and electrical services to make the work complete and ready for occupancy, temporary services may be approved to permit occupancy by the Owner at the earliest possible date.
G. STUDENT AREAS: No disruptive work is permitted between 10 PM and 10:00 AM in student living areas.

1.4 PROTECTION OF WORK AND ADJACENT PROPERTY

A. Buildings and adjacent areas may be subject to damage due to construction operations. At the completion of the project, the Contractor shall restore existing buildings, landscaping, turf, parking facilities, sidewalks, etc., to the same or better condition as prior to the start of the work.
B. In addition to requirements of the General Conditions of the Contract for Construction, the Contractor shall:
    1. Provide coverings over inlets, area drains, drywells, etc. to prevent soil and construction debris from running into the storm system. In the event of a failure of a covering, the Contractor is required to clean the affected piping and structures.
    2. Provide protection from rain, wind, and extreme temperatures to protect new work, materials, equipment, fixtures and adjacent areas from damage.
    3. Provide protection against stormwater back-ups when the storm system is affected by the work. Maintain flows as needed to avoid damage to the work and to surrounding areas.
    4. Provide temporary protection around openings through and at floors, roofs and other openings.
    5. Per the Florida Trench Safety Act, Section 553.60-64, F.S.: Provide and maintain proper shoring and bracing for excavations to prevent collapse or other damage until they can be properly back-filled upon completion of the new work.

1.5 SCHEDULING

A. Detailed construction scheduling is the responsibility of the Contractor. Schedules are to be updated and distributed to the Design Professional and USF-Project Manager weekly. An updated schedule is to be provided with each application for payment.
B. Provide schedules in CPM format in accordance with the Construction Contract. For less complex projects, a Gantt Chart may be used if approved by the USF-Project Manager.

END OF SECTION 011400

SECTION 012100 – ALLOWANCES

1.1 RESTRICTED USE

Allowances listed below are to be provided in the Contractor's Bid.

1.2 SUMMARY

A. This section includes administrative and procedural requirements governing the use of allowances.
B. Allowance amounts are included in the Base Bid.
C. Allowance amounts are to be entered on the Bid Form in the space provided.
D. Types of allowances may include the following:
   Contingency Allowance

1.3 CONTINGENCY ALLOWANCE

Contingency allowance: lump sum amount which is established for the Owner's discretionary use. Contingency allowance amounts are typically established on the Bid Form.

1.4 SUBMITTALS

A. Provide shop drawings, product data, samples and other submittals for work performed under allowance pricing in the same manner as other work performed under this Contract.
B. Prior to beginning the work, submit inspection request(s) to the Design Professional to verify the extent of work to be performed under Unit Cost Allowances.
C. Submit photographs at regular intervals, sufficient to document quantities of materials replaced under Unit Cost Allowances.
D. Upon completion of the work performed under Unit Cost Allowances, submit documentation of actual quantities installed, including delivery tickets, photographs, invoices, inspection reports and other documentation sufficient to document the actual quantity of work performed.

1.5 COORDINATION

A. Coordinate work performed under allowance pricing with other trades.
B. Update the project schedule as needed to accurately reflect the time allocated to performing the work. Scheduling requirements are specified elsewhere in these documents.

1.6 ADJUSTMENT OF ALLOWANCES

A. Contingency Allowances: expenditures from require written Owner approval in advance of any work being performed.
B. Unit Cost Allowances:
   1. Expenditures require written approval by the Owner based on the DESIGN Professional's verification of the actual quantity of work performed.
   2. Upon completion of the work, the allowance amount will be adjusted by Change Order. The amount of the adjustment will be based on a unit cost calculated from the original allowance.
   3. The Owner reserves the right to establish the fair value of the work by other means, in accordance with the General Conditions of the Contract.
C. Upon completion of the work, refund unspent allowances to the Owner by Change Order.

1.7 GENERAL

A. Requirements for work performed under allowance pricing are identical to the requirements for work performed under the base scope of the Project, as specified elsewhere in these documents.
B. Coordinate materials and their installation with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.
C. Document the extent of the allowance work on the red-marked field drawings, for incorporation into the final Record Documents.

END OF SECTION 012100

SECTION 012600 – CHANGES & CLARIFICATION PROCEDURES

1.1 SUMMARY

This section includes procedural requirements governing contract changes and clarifications.

1.2 CLARIFICATIONS

A. Definition: Clarification consists of additional information which further defines or which resolves conflicting information within the Contract Documents. The Design Professional will issue clarifications to the contract documents by one of the following means:
   1. Supplemental Instructions
   2. Written response entered into the Contractors Request for Information (RFI) form.

B. Clarifications, by definition, do not modify the Owner's Contract Documents.

1.3 CHANGES

A. Changes to the Contract Documents. Changes subsequent to the Award of Contract will be issued via one of the following means and are valid only when approved by the Owner:
   1. Change Order or Change Directive for changes which modify contract documents.
   2. Other written means as agreed.

B. Changes made by any other means are invalid unless expressly approved by the Owner in writing, including but not limited to:
   1. Annotations by the Design Professional on submittals and shop drawings
   2. Approval by the Design Professional of submittals and shop drawings which do not conform with the requirements of the Owner's Contract Documents
   3. Response to a Contractor's Request for Information (RFI)
   4. Field directive or field report
   5. Verbal directive or verbal approval of proposed change
   6. Architect's Supplemental Instruction

C. Changes are to be incorporated into the Contractor-maintained jobsite record set and the Design Professional–issued Record Documents.

1.4 PROCESS

A. Contractor initiated changes:
   1. Upon discovery that a clarification or change is needed to proceed with the work, the Contractor is required to submit a Request for Information (RFI) to the Design Professional. Requests for information are to include:
      a. Date, Project Name, Project Number, RFI number
      b. Requestor's name
      c. Originating party, if applicable - subcontractor or supplier
      d. Date by when the response is needed in order to avoid a delay to a critical path task. The RFI must be submitted a minimum of seven (7) calendar days prior to the response-needed date.
      e. Applicable references details and drawing sheet numbers, specification sections, and/or construction submittals as appropriate to convey the request.
      f. Sketches, photos, and other information as appropriate.
      g. The Contractors proposed solution.
      h. A statement as to whether the Contractor's proposed solution will impact the construction cost or schedule.
   2. Design Professional's Action: upon evaluation, the Design Professional will determine whether the Contractor's proposed solution is acceptable or will issue an alternate solution.
   3. In the event that the RFI response involves a change to the Contract, and such change may impact the construction cost or schedule, the Design Professional will issue the RFI response to the Contractor along with a Proposal Request (PR).

B. Owner initiated:
   1. The Owner may elect to change the Work as provided for in the General Conditions of the Construction Agreement, with the Contract sum being adjusted accordingly.
   2. Upon request by the Owner, the Design Professional will issue a Proposal Request to the Contractor in order to establish the impact of the proposed change, if any, on the Contract sum and project schedule.

1.5 PROPOSAL REQUESTS

A. The Contractor is required to submit a Change Order Proposal within seven (7) calendar days of issuance of a Proposal Request.
B. Change Order Proposals are to include the following minimum information:
   1. Summary of costs, broken down into general costs and by trade
   2. Detailed breakdown as described in the General Conditions of the Construction Agreement
   3. Supporting proposals from subcontractors and suppliers
   4. Schedule impact as supported by a schedule showing the effect of the change on critical path tasks
C. Unless the response time is extended by the Owner, the Contractor's failure to provide a proposal within seven (7) calendar days of receipt of a Proposal Request will indicate the Contractor's acceptance of the Design Professional's estimated value of the change.
D. In the event that the Contractor and the Owner do not agree on the cost and/or schedule impact of a proposed change, or when sufficient documentation cannot be provided within seven (7) days, the Owner may issue written direction to implement the change based on the Design Professional's estimate of the cost and/or schedule impact. Upon completion of the work, the Contractor may appeal the value as estimated by the Design Professional by following the procedures described in the General Conditions of the Construction Agreement.

1.6 CHANGE ORDERS and OWNER CONTINGENCY AUTHORIZATION

A. Change Orders:
   1. The Design Professional will prepare and issue Change Orders to the Contractor for execution and transmittal to the Owner.
   2. In the event that the Contractor fails to execute and transmit the Change Order to the Owner within ten (10) days, the Owner may elect to process the Change Order in accordance with the General Conditions of the Construction Agreement.
   3. Change Orders are to include, at a minimum, the following:
      a. Description of the change
      b. Time extension, if appropriate, associated with the change
      c. Back-up documentation for each item.
B. Emergency Field Change Order:
   1. The Owner may direct changes to the Work in the case of an emergency in accordance with the terms of the Construction Agreement. Such Emergency Field Change Orders shall be issued on the Owner's form and will include an estimated adjustment in the Contract Sum and Time to the extent that the adjustment can be estimated at that time.
   2. Emergency Field Change Orders are effective immediately upon issuance. The conditions of the Construction Agreement provide for detailed documentation and accounting of costs as the work progresses.
   3. Emergency Field Change Orders will be processed by standard Change Order at such time that the final adjustment is determined.

C. Owner Contingency Authorization:
   1. The Owner may issue written authorization to make changes to the Work which will be funded with the Owner Contingency allowance.
   2. When the dollar value of a change is based on a not-to-exceed estimate in lieu of a lump sum proposal, the Contractor is required to provide detailed documentation and accounting of costs upon completion of the work in order to establish the final value. Failure to provide detailed documentation of cost within 30 days after completion of the work indicates that the Contractor will accept the Design Professional's estimate of the final value.

END OF SECTION 012600

SECTION 012900 – PAYMENT PROCEDURES

1.1 SUMMARY

A. This section includes administrative and procedural requirements governing the preparation and processing of Applications for Payment.
B. Payments will be made for work in place and, in some cases, for materials stored on site.
C. Application for Payment: the term as used herein includes the following:
   1. AIA document G702, latest version OR form provided by the Owner upon request
   2. AIA G703 (Schedule of Values)
   3. Supporting documentation specified herein
D. Schedule of Values: A breakdown furnished by the Contractor allocating the Contract Sum to various portions of the Work and used as the basis for reviewing the Contractors Applications for Payment.

1.2 APPLICATIONS FOR PAYMENT

A. Each progressive Application for Payment shall be consistent with previous Applications and shall accurately reflect previous payments. The initial Application for Payment, Application for Payment following Substantial Completion, and the Final Application for Payment invoke additional requirements as specified herein.
B. Submittal Requirements:
   1. Certification Page (AIA G702 or Owner-provided form, at the Contractor's option):
      a. Complete every entry on form.
      b. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor
      c. Entries shall match the data on the Schedule of Values and shall coordinate with the construction schedule where applicable.
      d. Approved Change Orders shall be shown and accounted for. Pending and proposed change orders are **not** to be shown and, if shown, will delay processing.
   2. Supporting documentation:
      a. Schedule of Values, as described in detail elsewhere in this Section.
      b. For materials stored on site: inspection report from the Design Professional verifying material, quantity, and proper protection of the materials for which payment is requested. The contractor is required to pay all costs for inspection and verification of stored materials.
      c. Subcontractor pay applications.
      d. Updated construction schedule in the format specified in these documents.
      e. Other supporting documents as may be reasonably required by the Design Professional or Owner.
   3. Submit a complete and notarized copy of each Pay Application and back up documentation to the Design Professional covering the portion of the work completed as of the date indicated.
C. Retainage shall be held and released in accordance with the General Conditions of the Contractor's Agreement. Failure by the Contractor to properly account for retainage may result in delayed processing of the Application for Payment. In the event of over-billing, the corrective adjustment is to be made on the Pay Application immediately following.
D. Initial Application for Payment: In addition to the above requirements, include the following:
   1. List of subcontractors
   2. Construction schedule in the format required in these Contract Documents
   3. Schedule for Submittals
E. Application for Payment following Substantial Completion:
   In addition to the above supporting documentation, submit an accounting statement itemizing all changes to the Contract Sum.
F. Final Application for Payment: include the following:
   1. Updated schedule of values showing all approved changes to the Contract Sum.

2. Written notice signed by the Design Professional verifying that all contractual obligations have been satisfied, including but not limited to completion of work on site and satisfaction of close out requirements.
3. Final Consent of Surety, when required by these documents.
4. Final and Unconditional Subcontractor releases, when required by these documents.
5. Evidence that all claims have been settled.

Note: in the event that the Final Application for Payment is received by the Owner before all project close out requirements have been met, including receipt of acceptable close out documents, the Pay Application will be returned without action.

1.4 SCHEDULE OF VALUES - FORMAT AND CONTENT

A. Use the latest version of the AIA G703 Continuation Sheet and include the following general information on each page of the Schedule of Values:
   1. Project Name and Project Number
   2. Name of Design Professional
   3. Name of Contractor
   4. Date of Submittal
   5. Date range covered by the Application for Payment
B. Break down costs in sufficient detail to allow the Design Professional to accurately evaluate the invoice.
C. For multi-phased projects, provide a separate breakdown for each phase.
D. Use the Project Manual table of contents as a guide to establish the line items for the Schedule of Values. Provide a section on the Schedule of Values for each specification section or subcontract.
E. Further break down each section into specific items of work which may not progress concurrently and for which progress payments will be requested.
F. Each section of the Schedule of values is to show the following minimum level of breakdown to the extent that these apply to the specific item:
   1. Mobilization
   2. Cost of producing engineered signed/sealed drawings and calculations, when required by these specifications (delegated design)
   3. Materials
   4. Labor
   5. Equipment rental
   6. Change Orders and directives
G. Round off amounts to whole dollars before entering amounts into the Schedule of Values and before calculating the total. Do not enter and then hide cents. The total of the displayed scheduled values shall equal the Contract Sum.
H. In addition to work completed during the period covered by the Pay Application, show as completed any work invoiced under previous pay applications, whether payment has been received or not.
I. Invoice only for work completed as of the end date of the Application for Payment period.
J. Show all approved Change Orders and directives issued before the end date of the Application for Payment period, whether these are being invoiced or not.
K. Each item in the Schedule of Values shall be complete, including a proportionate share of general costs for each item, such as supervision, overhead, profit, and other general costs. Note: general cost items are to be shown as separate line items in the schedule of values when those items will be invoiced separately, such as costs for temporary facilities and surety bonds.
L. Provide a separate line item in the Schedule of Values for each allowance, and itemize each approved adjustment to each allowance.
M. Record change orders and directives on the next Schedule of Values following issuance of the change order or directive.

1.5 SUBMITTAL TO DESIGN PROFESSIONAL:

A. Schedule a meeting time to review the work in place with the Design Professional, concurrently with reviewing the application for payment.

B. In accordance with the Architect/Engineer's Agreement with the Owner, after appropriate observation of the progress of the work, the Design Professional shall certify to the Owner the amount due and shall forward the Application for Payment and supporting documents to the Owner for processing.

   If the Design Professional is unable to certify all or portions of the amount requested due to the absence or lack of supporting evidence, the Design Professional shall advise the Contractor of the deficiency. If the deficiency is not corrected at the end of three (3) days, the Design Professional may either certify the remaining properly supported amounts to which the Contractor is entitled, or return the application for payment to the Contractor for revision along with a written explanation.

C. Payments may be withheld or reduced for reasons cited in the General Conditions of the Contractor's Agreement.

D. The Design Professional will take appropriate action to process the Pay Application within seven (7) days of receipt.

1.6 PROCESSING OF PAYMENTS:

The Owner will process and release amounts due within thirty (30) days after receipt of the certified Pay Application.

END OF SECTION 012900

SECTION 013199 – PROJECT MEETINGS

1.1 PRE-CONSTRUCTION MEETING

The Contractor shall schedule the preconstruction meeting and shall furnish an agenda to the invitees no less than 3 business days prior to the scheduled meeting. The meeting will be attended by the USF-Project Manager, Design Professional, Contractor, and selected subcontractors as identified by the Contractor. Other attendees may include representatives of the User Group (UG), USF facilities staff, and Owner direct contracted vendors and contractors. Among items to be discussed are provisions specified in this division of the specifications.

1.2 PROGRESS MEETING

The Contractor shall schedule a weekly job progress meeting with major subcontractors and shall notify the Design Professional and the USF-Project Manager of the time and place of the meeting. The Contractor job progress meetings may occur concurrently with weekly OAC (Owner/Architect/Contractor) meeting. Subsequent meetings shall be held on the same day and hour of the week for the duration of the construction period. Notes shall be taken by the Contractor on discussions and decisions made at each meeting. The Contractor shall distribute typed copies of the Meeting Minutes to the USF-Project Manager and all attendees.

END OF SECTION 013199

SECTION 013200– SUBMITTALS & DOCUMENTATION

1.1 CONSTRUCTION SCHEDULE SUBMITTAL

Immediately following contract award, the Contractor shall prepare and distribute a construction schedule covering all divisions of the work. The schedule shall be broken down in sufficient detail to permit proper and complete coordination of all trades in each division of the work.

1.2 PRE-CONSTRUCTION PHOTOGRAPHS

A. The Contractor is required to thoroughly document existing conditions in the area of work prior to starting demolition or new construction and renovation activities. Digital images shall be identified with: project name, date taken, and exact location or direction of view. Photographs are to be submitted electronically to the USF-Project Manager and Design Professional.
B. Contractor is to photograph existing damage within the construction area, such as cracked sidewalks, marred finishes, discolored surfaces and the like. Contractor will be responsible to correct damage which is discovered upon completion of the project, if such damage could have reasonably resulted from construction activities, if such damage was not properly documented prior to starting work.

1.3 SUBMITTALS AND SAMPLES

A. Submittals and samples are to be provided as specified in individual sections.
B. The Contractor is required to review submittals of subcontractors and to indicate corrections by hand-marking the documents. Contractor's review stamp is to be provided on the cover page of the submittal.
C. Submittals are to be sent via e-mail in .pdf format to the Design Professional, and are to include a cover sheet provided by the Design Professional.
D. The Contractor will log submittals and will distribute copies of the updated submittal log at each O/A/C meeting for review. Log is to show each submittal and re-submittal and the dates received and sent.
E. The Design Professional will review and act on submittals within 7 days of receipt. In the event that the Design Professional requests additional information or clarification, the 7-day review period restarts when sufficient information is received by the Design Professional. Such additional information and clarifications are to be provided in writing.
F. Samples for the selection of colors and textures are to be provided in the size and color/texture range indicated in the individual sections. If color range is not specified, Contractor is to provide samples in the full range of available colors/textures.
G. Samples for ornamental work which include custom artwork or design work: the design and all associated rights shall become the property of USF after the ornamental work has been installed.

1.4 CERTIFICATION REQUIRED FROM SUPPLIERS AND INSTALLERS

To assure quality materials and workmanship, the Contractor is to provide Certifications, Test Reports and other information as specified in the USF standard Division 1, in addition to such documents as may be specified within individual sections of this Project Manual.

END OF SECTION 013200

SECTION 013500– HAZARDOUS MATERIALS

1.1 The Contractor shall notify the USF-Project Manager immediately upon discovery of suspected hazardous materials within the construction area such as asbestos, mercury, flammable fuels, explosive chemicals, etc. Refer to the USF Environmental Health and Safety standards.

1.2 For suspect materials encountered during construction, the Contractor may be required to retain the services of qualified testing agencies to identify hazards and recommend appropriate action. Such testing services, if required, will be provided under a change order.

1.3 Asbestos sampling and testing was completed at the subject facility in December of 2018. No presence of asbestos was detected.

END OF SECTION 013500

EMLab P&K
A TestAmerica Company

Report for:

Mr. Wilson Bull, CIH
University of South Florida
4202 E Fowler Ave, OPM100
Tampa, FL 33620-6980

Regarding: Project: PTA/PTB HVAC System; Bulk Sampling
EML ID: 2060175

Approved by:

Approved Signatory
Balu Krishnan

Dates of Analysis:
Asbestos PLM: 12-18-2018

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. The results relate only to the items tested. The results include an inherent uncertainty of measurement associated with estimating percentages by polarized light microscopy. Measurement uncertainty data for sample results with >1% asbestos concentration can be provided when requested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

EMLab P&K
6301 NW 5th way, Suite#: 1410, Ft. Lauderdale, FL 33309
(866) 871-1984 Fax (954) 776-8485 www.emlab.com

Client: University of South Florida
C/O: Mr. Wilson Bull, CIH
Re: PTA/PTB HVAC System; Bulk Sampling

Date of Sampling: 12-12-2018
Date of Receipt: 12-13-2018
Date of Report: 12-18-2018

ASBESTOS PLM REPORT

Total Samples Submitted:	11
Total Samples Analyzed:	11
Total Samples with Layer Asbestos Content > 1%:	0

Location: 181212-WSB-01A, 6" White Pipe Wrap and Mastic over Foamglass Insulation

Lab ID-Version‡: 9729890-1

Sample Layers	Asbestos Content
White Wrap	ND
Black Foam	ND
Gray Mastic	ND
Black Mastic	ND
Composite Non-Asbestos Content:	15% Cellulose 3% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 181212-WSB-01B, 6" White Pipe Wrap and Mastic over Foamglass Insulation

Lab ID-Version‡: 9729891-1

Sample Layers	Asbestos Content
White Coating	ND
White Wrap	ND
Black Foam	ND
Gray Mastic	ND
Composite Non-Asbestos Content:	10% Cellulose 3% Glass Fibers
Sample Composite Homogeneity:	Moderate

Location: 181212-WSB-01C, 6" White Pipe Wrap and Mastic over Foamglass Insulation

Lab ID-Version‡: 9729892-1

Sample Layers	Asbestos Content
White Coating	ND
White Wrap	ND
Black Foam	ND
Composite Non-Asbestos Content:	3% Glass Fibers
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

EMLab P&K
6301 NW 5th way, Suite#: 1410, Ft. Lauderdale, FL 33309
(866) 871-1984 Fax (954) 776-8485 www.emlab.com

Client: University of South Florida
C/O: Mr. Wilson Bull, CIH
Re: PTA/PTB HVAC System; Bulk Sampling

Date of Sampling: 12-12-2018
Date of Receipt: 12-13-2018
Date of Report: 12-18-2018

ASBESTOS PLM REPORT

Location: 181212-WSB-02A, White Duct Mastic

Lab ID-Version‡: 9729893-1

Sample Layers	Asbestos Content
White Mastic	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

EMLab P&K
6301 NW 5th way, Suite#: 1410, Ft. Lauderdale, FL 33309
(866) 871-1984 Fax (954) 776-8485 www.emlab.com

Client: University of South Florida
C/O: Mr. Wilson Bull, CIH
Re: PTA/PTB HVAC System; Bulk Sampling

Date of Sampling: 12-12-2018
Date of Receipt: 12-13-2018
Date of Report: 12-18-2018

ASBESTOS PLM REPORT

Location: 181212-WSB-02B, White Duct Mastic Lab ID-Version‡: 9729894-1

Sample Layers	Asbestos Content
White Mastic	ND
Sample Composite Homogeneity:	Good

Location: 181212-WSB-02C, White Duct Mastic Lab ID-Version‡: 9729895-1

Sample Layers	Asbestos Content
White Mastic	ND
Sample Composite Homogeneity:	Good

Location: 181212-WSB-02D, White Duct Mastic Lab ID-Version‡: 9729896-1

Sample Layers	Asbestos Content
White Mastic	ND
Sample Composite Homogeneity:	Good

Location: 181212-WSB-03A, Off-White Duct Mastic Lab ID-Version‡: 9729897-1

Sample Layers	Asbestos Content
Off-White Mastic	ND
Composite Non-Asbestos Content:	2% Nylon
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

EMLab P&K
6301 NW 5th way, Suite#: 1410, Ft. Lauderdale, FL 33309
(866) 871-1984 Fax (954) 776-8485 www.emlab.com

Client: University of South Florida
C/O: Mr. Wilson Bull, CIH
Re: PTA/PTB HVAC System; Bulk Sampling

Date of Sampling: 12-12-2018
Date of Receipt: 12-13-2018
Date of Report: 12-18-2018

ASBESTOS PLM REPORT

Location: 181212-WSB-03B, Off-White Duct Mastic Lab ID-Version‡: 9729898-1

Sample Layers	Asbestos Content
Off-White Mastic	ND
Composite Non-Asbestos Content:	2% Nylon
Sample Composite Homogeneity:	Good

Location: 181212-WSB-04A, Black Duct Expansion Joint Diaphragm Lab ID-Version‡: 9729899-1

Sample Layers	Asbestos Content
Black Coating	ND
Composite Non-Asbestos Content:	10% Nylon
Sample Composite Homogeneity:	Good

Location: 181212-WSB-04B, Black Duct Expansion Joint Diaphragm Lab ID-Version‡: 9729900-1

Sample Layers	Asbestos Content
Black Coating	ND
Composite Non-Asbestos Content:	10% Nylon
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

CHAIN OF CUSTODY

www.EMLabPK.com

EMLab P&K A TestAmerica Company

New Jersey: 3000 Lincoln Drive East, Suite A, Marlton, NJ 08053 * (866) 871-1984
Phoenix, AZ: 1501 West Knudsen drive, Phoenix, AZ 85027 * (800) 651-4802
SSF, CA: 6000 Shoreline Court, Suite 205, South San Francisco, CA 94080 * (866) 888-6653

Weather	Fog	Rain	Snow	Wind	Clear
Level: None	☐	☐	☐	☐	☐
Light	☐	☐	☐	☐	
Moderate	☐	☐	☐	☐	
Heavy	☐	☐	☐	☐	

002060175

CONTACT INFORMATION

Company:	University of South Florida (27596)	Address: 4202 E Fowler Ave, OPM100 Tampa, FL 33620-6980 USA
Contact	Mr. Wilson Bull, CIH	Special Instructions:
Phone:	(813) 974-0869	

PROJECT INFORMATION

Project ID:	PTA/PTB HVAC System		
Project Description:	Bulk Sampling		
Project Zip Code:	33620	Sampling Date & Time:	12/12/18 AM
PO Number:		Sampled By:	Wilson Bull

TURN AROUND TIME CODES (TAT)

- STD – Standard (DEFAULT)
- ND – Next Business Day
- SD – Same Business Day Rush
- WH – Weekend / Holiday

Rushes received after 2 pm or on weekends, will be considered received the next business day. Please alert us in advance of weekend analysis needs.

Sample ID	Description	Sample Type (Below)	TAT (Above)	Total Volume / Area (as applicable)	Notes (Temp, RH, etc.)	Asbestos Analysis – PLM (EPA method 600/R-93-116)
181212-WSB-01A	6" White Pipe Wrap/Mastic over Fiberglass Insul.	B	STD	Chilled Water Piping in M0003		☒
-01B	↓	↓	↓	↓		☒
-01C	↓			Chilled Water Piping in M0011		☒
-02A	White Duct Mastic			On Joints/Seams of Ductwork in M0003		☒
-02B	↓					☒
-02C				On Joints/Seams of Ductwork in 0002		☒
-02D				On Joints/Seams of Ductwork in M0011		☒
-03A	Off white Duct Mastic			On Joints/Seams of Ducts in M0003		☒
-03B	↓			↓		☒
-04A	Black Expansion Joint Diaphragm			M0003		☒
-04B	↓	↓	↓	M0011		☒

Analysis options (unchecked for all samples):
- Non-Culturable – Spore Trap: Fungi – Spore Trap Analysis; Spore Trap Analysis – Other particles
- Tape, Swab, Bulk: Direct Microscopic Exam (Qualitative); Quantitative Spore Count Direct Exam
- BioCassette™, Andersen, SAS, Swab, Water, Bulk, Dust, Soil, Contact Plates: 1-Media Surface Fungi (Genus ID + Asp. spp.); 2-Media Surface Fungi (Genus ID + Asp. spp.); 3-Media Surface Fungi (Genus ID + Asp. spp.); Culturable Air Fungi (Genus ID + Asp. spp.); Gram Stain & Counts (Culturable Air & Surface Bacteria); Legionella culture; Total Coliform, E. coli (Presence/Absence); Membrane Filtration (specify organism); MPN Bacteria (specify organism); QuantiTray – Sewage Screen
- Other Requests: Asbestos Analysis – PCM Airborne Fiber Count (NIOSH 7400); Asbestos Analysis – PLM (EPA method 600/R-93-116); PCR (specify test)

SAMPLE TYPE CODES			
BC – BioCassette™	ST – Spore Trap: Zefon, Allergenco, Burkard ...	T – Tape	D – Dust
A1S – Andersen		SW – Swab	SO – Soil
SAS – Surface Air Sampler	P – Potable Water	B – Bulk	
CP – Contact Plate	NP – Non-Potable Water	O – Other:	

RELINQUISHED BY	DATE & TIME	RECEIVED BY	DATE & TIME
[signature]	12/12/2018	[signature]	12/13/18 10:22

SECTION 013553– SECURITY PROCEDURES

1.1 SECURITY

A. UNIVERSITY POLICE DEPARTMENT: Any construction site located on any of the University of South Florida campuses fall under the jurisdiction of the University Police Department. Any incident requiring police service should be reported immediately to the USF-UPD or 911 (for emergencies).

USF-UPD non-emergency phone numbers	
Tampa Campus	(813) 974-2628
St Petersburg Campus	(727) 873-4444
Sarasota Manatee Campus	(941) 487-4210

1. Campus Police are state certified law enforcement officers and as such are authorized to take appropriate search actions as may be dictated by the specific probable cause and necessary in the judgment of the officer.
2. The University may seize items that may pose a danger to the safety and security of faculty, staff, or students.

B. CONSTRUCTION SITE SECURITY: Contractor shall be responsible for jobsite security. Contractor shall supply all locks and chains. USF may provide one USF Master Lock for accessibility.
1. Restrict the access of all persons entering the construction area to the agreed upon access route and to the actual site of the Work.
2. Restrict activities of workers to authorized areas. Workers shall not mingle in student or public areas.
3. Provide USF-Project Manager with keys to all construction gates and building entrances.
4. Post project contact list, to include 24-hour telephone numbers, for all key project staff members. Post list at major access points to the project site(s) and outside at the project office. Update as necessary.

END OF SECTION 01353

SECTION 014100– Building Code Administration & Regulatory Requirements

1.1 CODES AND REGULATIONS

A. Representative Regulatory Requirements that are commonly used for USF projects are listed below. This list is not to be considered all-inclusive of codes and regulations that may apply. The Contractor shall comply with all pertinent codes, standards, regulations and laws.

1.	Current edition of the Florida Building Codes in effect at time of permitting.
2.	Current editions Florida Fire Prevention Code in effect at time of permitting.
3.	Florida Elevator Safety Code, As currently adopted
4.	State Trench Safety Act, F.S. 553.60-64.
5.	OSHA Regulations (Title 29, Code of Federal Regulations).

B. The University of South Florida is a member of Sunshine State One-Call of Florida, Inc. (SSOCOF), Sunshine 811. All excavation work shall be preceded by contacting Sunshine 811, 48-hours prior to actual excavation work. Comply with F.S. Chapter 556, Underground Facility Damage Prevention and Safety Act.

C. University of South Florida, Facilities Management-Operations (FM-OPS) responds to “Dig Permit” requests. Contact FM-OPS for approval and coordination of all utilities locate, outages and tine-in.

1.2 USF BUILDING CODE ADMINISTRATION PROGRAM

A. PROCESS

1. The Design Professional prepares construction documents in accordance with applicable Codes.

2. The BCA reviews such documents for code compliance and returns written comments, if any, within 21 days.

3. The Contractor submits an application for a building permit, with the proper fee.

4. The BCA reviews the application and issues a Permit, if all application is complete.

6. The Contractor requests and the BCA performs code inspections.

7. When construction is substantially complete, as determined by the USF-Project Manager and Design Professional, Contractor will request a final code inspection. Within 48 hours of receipt of the inspection request, the BCA will inspect the work. Immediately upon inspecting, the Inspector will inform the USF-Project Manager of any work that remains to be corrected prior to occupancy or re-occupancy of the construction area.

B. PURPOSE: The purpose of this Program is to implement Building Code Administration for the University of South Florida Capital Improvement Program. Such regulated practice of building code compliance is necessary, in the interest of public health and safety, which shall be provided through compliance of all adopted codes and standards. The Program is administered by the Building Code Administrator (BCA), through documents reviews and construction inspections.

C. AUTHORITY: USF Building Code Administration Program is established under USF Policy 6-019, USF Building Code Administration Program, as required by Florida Statues and Board of Governors Regulation.

D. POLICY: Florida law and regulations require that all new buildings constructed and modifications to existing buildings be reviewed and inspected for compliance with adopted codes and standards. The policy requires that all Contractors undertaking construction, repair, or renovations/remodeling obtain a building permit. Permitted work requires inspection and certification for occupancy or re-occupancy.

E. RESPONSIBILITIES

1. A construction Permit must be issued by the Building Code Administrator (BCA) prior to start of any construction activity. Only the BCA has the authority to determine whether the scope of work requires a Permit. Only the BCA has the authority to authorize the early start of work pending the issue of a Permit. The BCA issues the Permit directly to the Contractor.

2. Prior to start of any construction activity, including, but not limited to; site development, site fencing, demolition, wall construction etc., an application for Permit must be made by the Contractor to the Building Code Administration office.

3. Upon receipt of a Notice to Proceed or Purchase Order the Contractor is solely responsible to ascertain the status of the Permit application. Work on site shall not begin until the Permit or authorization to start work in advance of the Permit has been issued by the BCA.

4. The Contractor is required to apply for and pay the Permit fee prior to issuance of the permit. The BCA has the authority to approve the start of Work prior to issuance of a permit; however, under no circumstances can Work begin on site without the application for permit and approval of the BCA to start the Work.

5. The BCA may levy a fine of double the application fee when Work is started without approval of the BCA.

END OF SECTION 014100

SECTION 014500 – QUALITY CONTROL

1.1 CONSTRUCTION DOCUMENTS - CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with more than one standard is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the greater quantity or more stringent standard of quality. When the requirements of standards differ, but otherwise appear to be equivalent, defer to the Design Professional for a decision before proceeding with the Work.

B. Specified Requirements: If the plans and specifications cite different or conflicting requirements for minimum quantities or quality levels, comply with the greater quantity or more stringent standard of quality. When the requirements of the documents differ, but otherwise appear to be equivalent, defer to the Design Professional for a decision before proceeding with the Work.

1.2 REPORTS AND DOCUMENTS

A. Where specified: Manufacturer's Technical Representative's Field Reports: Report shall include the following:
   1. Name, address and telephone number of the technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

B. Where specified: Factory-Authorized Service Representative's Reports: Report shall include the following:
   1. Name, address and telephone number of factory-authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

1.3 QUALITY ASSURANCE

A. Qualifications below establish the minimum qualification levels required. Additional requirements are specified in individual Specification Sections.
   1. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
   2. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

   3. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections.

1.4 QUALITY CONTROL

A. Design Professional Responsibilities: basic services include the following:
   1. Design Professional and each sub-consultant shall observe the Work at appropriate intervals and shall exercise due diligence to safeguard the Owner's interests.

   2. Work shall be inspected by the design professional before it is covered up.

   3. Design Professional shall distribute field reports to the Owner and Contractor within 7 days of each observation. Field Reports will note defects, deficiencies, noncompliance with the Contract Documents and/or unsatisfactory workmanship.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Testing: Where testing services are specified, engage a qualified testing agency to perform these services.

   2. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

   3. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work, including participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installation, inspection of completed Work, and reporting.

   4. Retesting/Reinspecting: Provide and pay for retesting and reinspecting for construction that replaced Work which failed to comply with the Contract Documents.

   5. Testing Agency Responsibilities:
      a. Notify Design Professional and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

      b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

      c. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

      d. Submit a certified written report of each test, inspection, and similar quality-control service through Contractor.

      e. The Testing Agency may not: release, revoke, alter, or increase the requirements of the Contract, or approve/accept any portion of the Work.

      f. Do not perform any duties of Contractor.

   6. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1.5 TESTING AND INSPECTION LOG

Testing and Inspection Log: Prepare and maintain a record of tests and inspections. Provide access to testing and inspection log for Architect's reference.

1.6 REPAIR AND PROTECTION

General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control

1.7 SERVICES BY INDEPENDENT SPECIALIST AGENCIES

Unless expressly exempted by the USF-FM, including but not limited to the following services, shall be performed by qualified independent testing agencies:

HVAC Systems testing

END OF SECTION 014500

SECTION 015200 – TEMPORARY UTILITIES, CONTROLS, FACILITIES, & SIGNAGE

1.1 NOISE AND DUST CONTROL:

A. Erect barriers as needed to contain fumes and dust to the construction area.
B. See Work Restrictions section for requirements related to disruptive activities.
C. Install adequate filters to prevent distribution of dust if HVAC systems are used during construction.

1.2 WATER AND MOISTURE CONTROL

The Contractor shall:

A. Prevent water intrusion and condensation in the building during construction. If water intrusion does occur, the Contractor shall take steps to immediately remove water/moisture and to prevent reoccurrence, including dehumidification.
B. Prevent entrapment of moisture with construction materials and components of construction. Remove porous materials which are damaged due to water/moisture prior to growth of mold.
C. Respond immediately to conditions that provide a suitable environment for the growth of mold.
D. When dry-out operations are performed and the affected materials remain in place, the Contractor is to arrange and pay for periodic inspections by a qualified consultant as recommended by the USF-EHS Department. If mold is observed, the contractor shall be responsible to retain a qualified agency to treat mold. Treatment can include application of an agent, encapsulation and/or removal of material, suspect or damaged.
E. Per USF Guidelines, Contractor is required to maintain the humidity level in the construction area at 55% RH to prevent mold and mildew. In the event that mold/mildew occurs, all costs associated with testing and remediation will be borne by the contractor

1.3 SITE DRAINAGE

The Contractor shall provide temporary drainage trenches, drains, sumps, pumps, or other items required to afford satisfactory working conditions for the execution and completion of the work of all contractors and to protect all work. Water shall be diverted to or shall be pumped from the work areas without causing a nuisance to surrounding areas or potential regulatory non-compliance.

1.4 FIELD OFFICES AND OTHER TEMPORARY STRUCTURES:

A. Field Offices, when required, shall be provided and maintained by the Contractor in a clean, weathertight condition. All expenses shall be borne by the contractor.
B. Temporary storage facilities, when required: Contractor shall provide suitable weather tight storage units of sufficient size to hold materials required on the site at one time, for storage of materials which might be damaged by the weather. Outdoor storage of materials shall be confined to the areas within the construction fence and not under the canopies of trees.
C. Construction Stairs: Scaffold stairs are to be provided by the Contractor for projects requiring roof access except when a roof hatch is available.

1.5 TEMPORARY BARRIERS AND FENCING

A. Barriers for Excavation of Utilities: 40-inch high mesh safety fencing, on 2x4 posts, a minimum of 48-inches from excavation. Caution tape alone is not acceptable. Provide 2x4 top rail where excavations/trenches cross or run adjacent to pedestrian/bicycle pathways.

1.6 TEMPORARY SIGNAGE

The following signs are to be provided on the outside perimeter of the construction area:

A. Traffic Signs – See Vehicular Access, Parking and Traffic section.
B. No Trespassing Signs
C. Contractor Safety Signs: When required, OSHA, NFPA, and DOT safety signs.
D. Construction Site Entry Sign: the name of the Contractor & emergency phone number in letters no larger than 6 inches height, and the words: “Construction Entry”.

END OF SECTION 015200

SECTION 015500 – VEHICLE ACCESS, PARKING, & TRAFFIC CONTROL

1.1 TEMPORARY UTILITIES

A. General
Contractors is required to arrange, coordinate for and pay for all temporary utilities required for execution of the work.

B. Utility Company Installations
The Contractor is required to submit the proposed routing for temporary utilities to the Design Professional and USF-Project Manager for review and approval.

C. Connection to Existing Utilities
If connections to University utilities are permitted, the Design Professional shall obtain drawings of existing utilities and shall consult the USF-Project Manager regarding services available and points of connections to services. All services shall be metered through meters furnished by the contractors and the University shall be reimbursed for water, fuel, chilled and hot water, and power consumed.

D. Duration of Services
The Contractor is responsible for providing continuous utility services until date of Substantial Completion, including operation of permanent equipment and services.

1.2 NOISE AND DUST CONTROL:

A. Erect barriers as needed to contain fumes and dust to the construction area.
B. See Work Restrictions section for requirements related to disruptive activities.
C. Install adequate filters to prevent distribution of dust if HVAC systems are used during construction.

1.3 WATER AND MOISTURE CONTROL

The Contractor shall:

A. Prevent water intrusion and condensation in the building during construction. If water intrusion does occur, the Contractor shall take steps to immediately remove water/moisture and to prevent reoccurrence, including dehumidification.
B. Prevent entrapment of moisture with construction materials and components of construction. Remove porous materials which are damaged due to water/moisture prior to growth of mold.
C. Respond immediately to conditions that provide a suitable environment for the growth of mold.
D. When dry-out operations are performed and the affected materials remain in place, the Contractor is to arrange and pay for periodic inspections by a qualified consultant as recommended by the USF-EHS Department. If mold is observed, the contractor shall be responsible to retain a qualified agency to treat mold. Treatment can include application of an agent, encapsulation and/or removal of material, suspect or damaged.

1.4 SITE DRAINAGE

The Contractor shall provide temporary drainage trenches, drains, sumps, pumps, or other items required to afford satisfactory working conditions for the execution and completion of the work of all contractors and to protect all work. Water shall be diverted to or shall be pumped from the work areas without causing a nuisance to surrounding areas or potential regulatory non-compliance.

1.5 FIELD OFFICES AND OTHER TEMPORARY STRUCTURES:

A. Field Offices, when required, shall be provided and maintained by the Contractor in a clean, weathertight condition. All expenses shall be borne by the contractor.
B. Temporary storage facilities, when required: Contractor shall provide suitable weather tight storage units of sufficient size to hold materials required on the site at one time, for storage of materials which might be damaged by the weather. Outdoor storage of materials shall be confined to the areas within the construction fence and not under the canopies of trees.
C. Construction Stairs: Scaffold stairs are to be provided by the Contractor for projects requiring roof access except when a roof hatch is available.

1.6 TEMPORARY BARRIERS AND FENCING

A. Barriers for Excavation of Utilities: 40-inch high mesh safety fencing, on 2x4 posts, a minimum of 48-inches from excavation. Caution tape alone is not acceptable. Provide 2x4 top rail where excavations/trenches cross or run adjacent to pedestrian/bicycle pathways.
B. Construction Fence: Provide 6' high chain link fence around the project site. Fence location shall be as shown on the construction drawings or as approved by the Owner.
   1. Provide green wind screen.
   2. Turn fence fabric so that barbed edge is at bottom. Turn wire ties so that cut ends face inward, towards the construction area.
   3. Provide "No Trespassing" signs, which meet OSHA requirements, shall be specified.
   4. Leave fence in place until the project or phase has achieved Substantial Acceptance.
C. Tree Barricades: Provide 40-inch high mesh safety fencing, on 2x4 posts and top rail, at canopy drip line. At his own expense, the Contractor will be required to replace safety fencing with wood post and rail barricade if construction activities occur within the drip line of the canopy.

1.7 TEMPORARY SECURITY MEASURES

A. Building Security: During construction, one exterior door of any enclosed structure shall be provided with a lockset with security core. The Contractor shall obtain security core from and return same to the USF-Project Manager.
B. Gates and Temporary Doors: gates and temporary doors into the Construction Area shall be kept locked by the Contractor at all times. All gates and temporary doors shall be double locked with a USF security padlock and the contractor's padlock in a manner that will allow access by unlocking either padlock.

1.8 TEMPORARY SIGNAGE

The following signs are to be provided on the outside perimeter of the construction area:
A. Traffic Signs – See Vehicular Access, Parking and Traffic section.
B. No Trespassing Signs
C. Contractor Safety Signs: When required, OSHA, NFPA, and DOT safety signs.
D. Construction Site Entry Sign: the name of the Contractor & emergency phone number in letters no larger than 6 inches height, and the words: "Construction Entry".

END OF SECTION 015500

SECTION 017800 – CLOSE OUT & INSPECTION PROCEDURES

1.1 SECTION INCLUDES:

Substantial Completion and Occupancy procedures
Final Completion procedures
Final cleaning procedures
Close Out Documents and procedures

1.2 RELATED REQUIREMENTS:

A. Refer to the Building Code Administration & Regulatory Requirements Section for **Code Inspection Procedures.**

B. Refer to the Construction Contract Terms and Conditions for general requirements related to Contract Close Out.

C. Refer to individual sections for specific requirements related to Contract Close Out.

D. Refer to individual sections for additional requirements, such as extra stock requirements.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

To achieve Substantial Completion status, the Project must be complete and useable for its intended purpose, including fully functioning mechanical, electrical, plumbing, communication, and other systems. Each component and system must be complete to the extent which will allow the Contractor and Design Professional to generate a list of specific deficiencies (Punch List).

A. Substantial Completion Inspection:
   1. Pre-Inspection Tasks: prior to requesting the Substantial Completion Inspection, complete the following:
      a) Startup and testing of systems and equipment
      b) Replacement of lamps and HVAC filters used during construction
      c) Removal of temporary facilities and temporary utilities from the jobsite
      d) Final cleaning
      e) Touchup painting
   2. Submittals: A minimum of 5 business days prior to the requested Substantial Completion Inspection date, submit the following to the Design Professional:
      a) Statement that work is complete, and request for inspection
      b) Contractor's Punch List, as described in this Section
      c) Water system bacteriological test result, if applicable
      d) Fire alarm system certification, if applicable

   3. Scheduling:
      a) Upon receipt of the above, the Design Professional will either notify the Owner that the Project, in their professional opinion, is ready for inspection or will advise the Contractor of unfulfilled requirements.

      b) When the Project is deemed ready for inspection, the Design Professional and Contractor will agree on a mutually acceptable date and time for the inspection and will notify the USF-Project Manager a minimum of 7 days prior to the inspection date.

      c) The appropriate Subcontractors, as determined by the General Contractor, shall be present at the Substantial Completion inspection to demonstrate operation of systems to Design Professional and Owner.

d) In the event that the Contractor has not met the requirements to achieve Substantial Completion status, reinspection is to be requested in accordance with the same procedures described above. Costs associated with reinspection will be borne by the Contractor.

B. Substantial Completion Acceptance:
1. When the Design Professional has determined that the Work is Substantially Complete and that the Project is ready for occupancy, the Design Professional will issue the Certificate of Substantial Completion with Punch List attached and Certificate of Occupancy.

Note: should any systems or areas of the Project be excluded from the Acceptance, those systems/areas shall be clearly noted on the Certificate and on the Punch List as "excluded". It is the responsibility of the Design Professional to ensure that those systems/areas are inspected following the same procedures above, and documented on a separate Certificate of Substantial Completion prior to issuance of the Certificate of Final Inspection.

2. **Owner Occupancy**: Beginning at Substantial Completion, the Owner will occupy the completed areas and access will be controlled by USF Staff. The Contractor is required to schedule punch list work so as to avoid disrupting Owner's operations.

C. Contractor's Punch List:
1. The Contractor's Punch List is to encompass the entire project including but not limited to: new construction, remodeled and renovated areas, exterior building work, sitework, and close out requirements.

2. Areas, systems and components of the Work which are incomplete are to be simply noted as "not ready" to call attention to the fact that a separate inspection is required when the item is complete.

3. Organization and format of Contractor's Punch List:
a) Submit Punch List to the Design Professional in MS Excel format.

b) List items under their respective room numbers, and list each area affected by construction, including exterior areas. Describe each item needing correction in sufficient detail. If necessary, list areas disturbed by construction operations that are outside the limits of construction.

D. **Beneficial Occupancy**: The Owner reserves the right to install furniture/equipment and to occupy completed areas of the project prior to Substantial Completion, provided that such occupancy does not interfere with completion of the work. Such occupancy shall not constitute acceptance of the work.

1.4 FINAL COMPLETION PROCEDURES

To achieve Final Completion status, all contractual obligations must be 100% complete, including the submittal of Close Out Documents and resolution of accounting issues.

A. Final Completion Inspection
1. Prior to the requested Final Completion Inspection date, the Contractor is required to submit the following:
a) Statement that all work on site is complete.
b) Close Out Documents.
c) Specified extra stock materials.

2. Scheduling:
   a) Upon receipt of the above, the Design Professional will either notify the Owner that the Project, in their professional opinion, is ready for inspection or will advise the Contractor of unfulfilled requirements.

   b) When the Project is deemed ready for inspection, the Design Professional and Contractor will agree on a mutually acceptable date and time for the inspection and will notify the Facilities Operations representative a minimum of 7 days prior to the inspection date.

   c) In the event that the Contractor has not met the requirements to achieve Final Completion status, reinspection is to be requested in accordance with the same procedures described above. Costs associated with reinspection will be borne by the Contractor.

3. Close Out Documents:
   a) Submit the documents and perform the related tasks listed on the attached standard Close Out Document Checklist.

   b) Review the individual specification sections carefully and submit any additional Project-specific Close Out documents and extra stock, and perform any additional Owner Training, whether or not listed on the attached Close Out Document standard checklist.

B. Final Completion Acceptance:
When the Design Professional has determined that the work hachieved Final Completion status, the Design Professional will issue the Certificate of Final Inspection within seven (7) days of the Final Completion Inspection date:

1.5 FINAL CLEANING

A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

B. Complete the following cleaning operations before requesting inspection for Substantial Completion for entire Project or for a designated portion of the Project.

1. Clean Project grounds in areas disturbed by construction activities, including landscape areas, of rubbish, waste material, litter, and other foreign substances.

2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.

   Use magnetic sweeper to remove all construction debris from grounds. Do not install sod and do not release paved areas to the Owner until all areas have been cleaned. Call for inspection of fine graded and raked areas prior to installing sod.

3. Clean exposed exterior and interior hard-surfaced finishes to be free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

4. Clean concrete and masonry surfaces of excess mortar, grout, and splatter. Final appearance is to show no evidence of stains or the cleaning process.

5. Clean metal railings, flashings and trim work affected by construction. Final appearance is to be like-new.

6. Sweep concrete floors broom clean in unoccupied spaces.

7. Vacuum floors, removing debris. Clean in accordance with manufacturer's instructions to restore finishes damaged by construction.

8. Clean transparent materials streak-free, including mirrors. Remove glazing compounds and other noticeable, vision-obscuring materials.

9. Remove labels that are not permanent.

10. Wipe surfaces of mechanical and electrical equipment and similar equipment.

11. Clean plumbing fixtures to a sanitary condition, free of stains.

12. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

    Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

1.6 CLOSE OUT DOCUMENTS

A. Record Documents:
   1. Contractor's Responsibilities: The Contractor shall maintain at the construction site a set of printed Construction Documents (drawings and specifications) for the purpose of documenting, with a red pencil or red ink pen, any variances from the construction documents. At the completion of construction, the Contractor's printed red-lined documents shall be submitted to the Design Professional.
   2. Design Professional's Responsibilities: After final acceptance of the project, the Design Professional shall revise the Construction Drawings and Specifications to accurately record all changes noted in the Contractor's red-lined set, all addenda, all executed alternates, all options selected, and any other change to the original documents. Such revised set of construction documents shall be known and noted as the "RECORD DOCUMENTS" (drawings and specifications).
      Submit Record Documents to the USF-Project Manager in .pdf format for review and approval. If any changes were not properly recorded, the Consultant will make the corrections and submit a final set of Record Documents, as follows: One set of prints (drawings and specifications), and electronic files (CAD drawings and specifications in .dwg and .pdf files). Note that Specifications shall be also modified by accurately recording any changes and selections made during construction.

B. Operation and Maintenance Manuals:
   1. Requirements for O&M Data is stipulated in the appropriate sections of the specifications. The items listed in the attached checklist are to be provided in .pdf format, unless otherwise noted, to the USF-Project Manager in order to achieve Final Completion status.
   2. Format: Manuals shall consist of manufacturers' operation instructions and maintenance data, shop drawings or catalog cuts, and other data listed herein; all bound into a single BOOKMARKED .pdf document for EACH ITEM for which an O&M Manual is specified to be provided. Material shall be assembled as follows:
      a) Page 1: Project Name, Name of Contractor, Name of Installer, and Name of Manufacturer.
      b) Page 2: Table of Contents

c) Page 3: Overall description of the equipment or system
d) Written description of system contents, where equipment is located in building, how each part functions individually and how system works as a whole, concluded with a list of items requiring service and the service needed or reference to the manufacturer's data in the binder which describes proper service.
e) A copy of each shop drawing, stamped by the Design Professional.
f) Manufacturer's operating instructions with an index at the beginning of the section.
g) A list of all equipment incorporated into job, supplier's name and address.

CONTRACTOR'S CLOSE-OUT DOCUMENT CHECKLIST

CONTRACTOR'S CLOSE-OUT DOCUMENTS

The Contractor is required to submit a .pdf copy of the documents listed below to the Design Professional. Complete documents must be submitted in order to achieve Final Completion status. The Design Professional will review and compile a list of deficiencies, if any, and forward the documents to the USF-Project Manager for review.

Prior to Substantial Completion, Contractor is to submit the following to the Design Professional:

- ☐ Red-marked field drawings for Design Professional's use in preparing Record Drawings
- ☐ Fire Alarm Certification

Prior to Final Completion, Contractor is to submit the following documents to the Design Professional:

- ☐ List of subcontractors including telephone numbers and contact names
- ☐ Receipt showing quantities of the specified extra stock materials, signed by recipient
- ☐ Test and Balance Report with Design Professional's approval letter

Warranties, Test Results and Certifications:

- ☐ Specified extended warranties, dated to commence at Substantial Completion

Operation and Maintenance Manuals

- ☐ Electrical systems, including switchgear, panelboards, surge suppression, etc.
- ☐ HVAC equipment
- ☐ Other equipment as specified

Accounting Data:

- ☐ For Bonded Projects: Original Consent of Surety to final payment
- ☐ Documentation of cost of changes implemented on a not-to-exceed basis, if not previously submitted

Additional Stock:

- ☐ (1) Complete set of additional filters for each AHU – Pre-filters and Main Filters

Design Professional's Close-Out Documents (listed here for convenience)

- ☐ Record Drawings in .**pdf and .dwg** format, meeting USF CADD and drafting standards
- ☐ Submittals and shop drawings with Design Professional's approval stamp
- ☐ Certificate of Final Inspection

END OF SECTION 017800

SECTION 230000 - MECHANICAL GENERAL

PART 1 - GENERAL

1.1 Scope of The Work

The scope of the work included under this section of the Specifications shall include complete installation of the mechanical, electrical, and control systems. The general conditions and special conditions of these Specifications shall form a part and be included under this section of the Specifications. The Contractor shall provide all supervision, labor, material, equipment, machinery, plant, and any and all other items necessary to complete the specified systems. All items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items of equipment as indicated on the drawings, and as required for complete systems.

1.2 Specific Requirements of The Project

A. It is the intention of this project to adhere to the following schedule

Award Bid: February 2019
Procurement: March - April 2019
Commence Construction on Site: May 1, 2019
Substantial Completion: July 1, 2019

B. It shall be the responsibility of the Contractor to coordinate the milestone schedule of the construction with the Project Coordinator, consultants, and all subcontractors.
C. Refer to sheet M-11 for contractor's laydown and mobilization area.
D. All metallic items being demolished or removed shall be stored, in an area to be designated by the owner, for selective salvage and scrapping.
E. It is imperative for the Contractor to implement the following processes during construction:
   1. Laydown, mobilization, and parking shall be on a designated area to be determined and agreed upon by the owner.
   2. Area of the construction shall be barricaded, in accordance with USF requirements and safe working conditions, to keep non-construction activities out.
   3. Contractor shall proceed with demolition work only upon approval of the demolition schedule by the project coordinator and project engineer.
   4. It shall be the responsibility of the Contractor to ensure that all subcontractors understand the full scope of the project and review all disciplines within the design documents, not just their specific scope. Each contractor shall be responsible to implement tasks, regardless whether the specific requirements are covered on the respective section of documents or not.
   5. The substantial completion inspection shall occur upon completion of the project, contractors will be allowed ample time to complete any punch list items and prepare for final inspection.
   6. The Contractor shall provide a full time, non-working superintendent to manage the project, it shall be the responsibility of the project's superintendent to:
      a. Be familiar and understand the full extent of the scope of the project.
      b. Be available to respond to the subcontractors.
      c. Ensure all RFIs are addressed in an expeditious manner.
      d. Facilitate communications and construction directives among the Engineer, subcontractors, Project Coordinator, and Project Inspector.
      e. Keep current records regarding all project communications, inspections, changes, and directives.
      f. Supervise the subcontractor's work for compliance with safety regulations in addition to compliance with the plans and specifications inclusive of all change orders, CCDs, ASI's and all other deviations accepted by the owner.

7. Location of a construction trailer as well as storage of materials and equipment shall be limited to an area outside the facility. Contractor shall submit a proposed laydown plan for review by the engineer and owner for approval. Under no circumstance shall equipment be stored at the site with no protection.
8. Owner will accept the equipment when installed and in operation; therefore, the protection of equipment until owner acceptance shall be the responsibility of the Contractor. Equipment received by the Contractor shall be checked for compliance with the bid documents; for manufacturer, model, voltage, etc. This inspection shall also be to visually inspect the equipment for any damage. Any equipment, or material not in compliance with the specifications or bid documents shall be returned to the manufacturer at no cost to the owner. A running report shall be maintained logging the time, date, and status of all equipment deliveries whether accepted or returned, inclusive of photographs. The Contractor shall make the report available upon request by the engineer or the owner.
9. The Contractor shall maintain a single superintendent who is qualified to manage the volume and complexity of the project scope. The owner and project engineer reserve the right to remove the Contractor's superintendent if found to be negligent in their duties
10. The services of the Test and Balance contractor shall be provided by the contractor. The Test and Balance contractor shall coordinate with by the Contractor and mechanical contractor to be present during start up.
11. As part of the submittal package, the Contractor shall provide the following information:

    - Designated Project Superintendent.
    - Name of the Mechanical Contractor.
    - Name of the Electrical Contractor.
    - Name of the Controls Contractor.
    - Name of the Test & Balance Agency.

    Inclusive of the above provide the contact name, phone number, web address, and e-mail address of each.

15. The Contractor shall provide close-out documents in accordance with specification section 017800 – Close Out and Inspection Procedures:

1.3 Bid Submission Requirements

A. The demolition drawings are prepared based on as-built drawings and field surveys. The drawings are detailed to the extent to show the existence of every trade present. Every effort is made to indicate any available equipment devices, materials, or components, which could affect the scope of the project.
B. The Contractor shall survey the facility with their contractors/sub-contractors prior to submission of their bid. Any conflict, questions, or concerns shall be reported for clarification via RFI to the Engineer, with at least 10 days for response, prior to bid. Submission of a bid constitutes acceptance of the design documents in their entirety.
C. It is the intent of this project to complete the work in 2 phases. Prior to Phase 1 construction contractor will receive 8 week procurement period. Phase 1 will consist of all work in 094-PTA. The contractor shall be allowed 4 weeks to complete all work in PTA as defined in the drawings and specifications. Upon completion of 094-PTA the contractor shall commence work in 097-PTB. The contractor will be allotted 4 weeks total to complete all work in PTA. 30 days will be provided for punch list completion at the end of Phase II.

1.4 Scope of Demolition - Mechanical

A. The scope of the demolition work is described within the construction drawings. Refer to Electrical and General drawings for specific demolition requirements.
B. The CM shall provide a demolition schedule inclusive of all demolition activity including down times.
C. Removal of equipment and materials shall not damage any existing facility components including walls, floors, ceilings, structures, glazing, doors and openings.
D. All piping and conduit to be demolished shall be done so with special consideration to prevent impacts on the rest of the facility.
F. All equipment and metallic materials shall be stored on site at a specific area designated on sheet G-11 for selective salvage and scrapping by the owner.
G. The controls contractor shall verify all existing Low voltage and controls devices, whether identified on the drawings or not, related to the operation of the existing AHU's, VAV's, and BTU meters.
H. The worksite lay down area, and mobilization area shall be kept orderly and clean daily.
I. Any saw cutting or dust generating activity conducted in the building shall be done so with the use of vacuum or liquid mitigation. Provide submittal information related to proposed method of removal.

1.5 Scope of Installation - Mechanical

A. Scope of new mechanical work is described on drawings M-12, M-15 & M-41, M-51, M-61, & M-71. Refer to electrical drawings for specific installation requirements.

1.6 Quality Assurance

A. All materials, installations, products, and equipment shall meet or exceed the requirements of the of the following:
   1. Florida Building Code 2017 (6th Edition.)
   2. Florida Building Code – Plumbing 2017
   3. Florida Building Code – Mechanical 2017
   4. Florida Building Code – Gas 2017
   5. Life Safety Code and 2010 Florida Fire Prevention Code.
   6. National Fire Protection Association 2018
   7. Local Health Department Requirements
   8. National Electrical Code 2017
   9. USF Design and Construction Guidelines and Requirements at the web address below:

   http://www.usf.edu/administrative-services/facilities/design-construction/guidelines-standards.aspx
B. Electrical work shall meet or exceed the standards for installation and good workmanship as set forth in the latest copy of the National Electrical Contractors Association publication entitled "NECA Standard of Installation, except as modified in these specifications or shown on the drawings.
C. Material and equipment installed under this contract shall be new, in current production, un-deteriorated, and of a quality not less than the minimum specified. Material for which underwriters' examination services is provided shall bear the UL label.

1.7 Intent

A. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."
B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.
C. "Products": Includes materials, systems, and equipment.
D. “Work": The providing of products for the entire contract.
E. "Concealed": Embedded in or installed behind walls, within partitions, above suspended ceilings, in trenches, in tunnels, and crawl spaces.
F. "Exposed": Not installed underground or "concealed" as defined above.

1.8 Measurements

A. The Contractor shall base all measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.
B. Should the Contractor discover any discrepancy between the actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer and shall not proceed with his work until he has received instruction from the Engineer.

1.9 Drawings

A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. Drawings are not to be scaled. The drawings and details shall be examined for exact location of the equipment. Where they are not definitely located, this information shall be obtained from the Engineer.
B. The Contractor shall follow drawings in laying work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom space conditions at all points. Where headroom or space conditions appear inadequate, Engineer shall be notified before proceeding with the installation.
C. If directed by Owner, the Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
D. Examine the contract documents and immediately report any error, discrepancy, or omission. The Owner will determine which interpretation shall take precedence where two or more conflicting statements occur. Contractor is responsible for more stringent interpretation.

1.10 Shop Drawings

A. The Contractor shall submit for review, detailed shop drawings of all equipment, piping, and all material required to complete the project. No material or equipment may be delivered to the job site or installed until the Contractor has in his possession the reviewed shop drawings for the material or equipment. The shop drawings shall be complete as described herein. The Contractor shall furnish no less than six (4) copies in 3-ring binders and a .pdf digital file for each submittal or submission, clearly identified.

B. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow Engineer ample time for checking, submit for review, detailed dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance characteristics, and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish, and durability to that specified.
C. Samples, drawings, specifications, and catalogs submitted for review shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, Contractor's name, and name of job.
D. Catalogs, pamphlets, or other documents submitted to describe items on which review is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.
E. Review rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, said review does not mean that drawings have been checked in detail; said review does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawing and specifications.
F. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time and no claim for extension by reason of such default will be allowed.

1.11 Equipment Deviations

A. Where the Contractor proposes to use an item of equipment, other than that specified or detailed on the drawing, which requires any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical, electrical, or architectural layout, all such redesign and all new drawings and detailing required therefore shall be prepared by the Contractor, at his own expense, and review by the Engineer.
B. Where such reviewed deviation requires a different quantity and arrangement of piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such piping, structural supports, insulation, controllers, motors, starters, electrical wiring, and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

1.12 Cooperation with Other Trades

A. This contractor shall give full cooperation to the other trades and shall furnish in writing to them, with copies to the Owner, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
B. Where the work of the contractor will be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Owner, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 1/4" = 1'0", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.
C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, settings plans, and shop details for the proper installation of his work and for the purpose of coordinating adjacent work.

1.13 Protection

A. The Contractor shall protect all work and material from damage by his work or workmen and shall be liable for any/all damage caused.
B. The Contractor shall be responsible for work and equipment until finally inspected, tested and accepted; he shall protect work against theft, injury or damage and shall carefully store material and equipment received on site that are immediately installed. He shall close open ends of work with temporary covers or plugs during storage and construction to prevent entry of obstructing material.

1.14 Scaffolding, Rigging, & Hoisting

A. This Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

1.16 Material and Workmanship

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected, and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where not specific kind or quality of material is given, a first-class standard article as reviewed by the Engineer shall be furnished.
B. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers, and labor required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system.
C. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with review by the Engineer in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

1.17 Quiet Operation and Vibration

A. All work shall operate under all conditions of load without any sound of vibration that is objectionable in the opinion of the Owner. In the case of moving machinery, sound or vibration noticeable outside of room will be considered objectionable. Sound or vibration conditions considered objectionable by the Owner shall be corrected in an approved manner by the Contractor, at his own expense. Vibration control shall be by means of approved vibration eliminators in a manner as recommended by the project acoustical consultant.

1.18 Accessibility

A. Contractor shall be responsible for the sufficiency of the size and the adequate clearance for the proper installation of this work. He shall cooperate with the other contractors whose work is in the same space. Such space and clearances shall, however, be kept to the minimum size required.
B. Contractor shall locate all equipment which must be serviced, operated, or maintained, in fully accessible positions. Equipment shall include, but not be limited to valves, traps clean-outs, motors, controllers, switchgear, and drain points. Minor deviations from drawings may be made to allow for better accessibility.
C. The Contractor shall provide access panels and boxes for each concealed or below grade valve, or other device requiring service.

1.19 Foundations, Supports, Piers, & Attachments

A. Contractor shall furnish and install all necessary foundations, support pads, bases, and piers required for all equipment, piping, pumps, and for all other equipment furnished under this contract, and shall submit drawings to the Engineer for review before purchase, fabrication or construction of the same.
B. All equipment, unless shown otherwise, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that, in the opinion of the Owner/Engineer, are not strong enough shall be replaced as directed.

1.20 Electrical Connections

A. The electrical contractor shall furnish and install all wiring except: (1) temperature control wiring; (2) mechanical equipment control wiring; (3) mechanical interlock wiring. The Electrical Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power working through starters. Electrical Contractor shall provide and install all starters not factory-mounted on equipment.
B. The Controls Contractor shall, regardless of voltage, furnish and install all temperature control wiring, and all interlock wiring, and equipment control wiring for the mechanical equipment. The Electrical Contractor shall provide and be responsible for the heater in all starters.
C. After all circuits are energized and completed, the Electrical Contractor shall be responsible for all power wiring; all control wiring shall be the responsibility of the Mechanical Contractor. Motors and equipment shall be provided for electrical characteristics as shown on the schedules.

1.21 Cutting and Patching

A. This Contractor shall provide all cutting and patching necessary to install the work specified in this section. Patching shall match adjacent surfaces.
B. No structural member shall be cut without the approval of the Owner, and all such cutting shall be done in a manner directed by him.
C. Cutting through floors and walls shall not create stress concentration and shall not create damage to the existing structures and supports.

1.22 Sleeves and Plates

A. This Contractor shall provide and locate all sleeves and inserts required.
B. Sleeves shall be provided for all mechanical piping passing through wall construction. Sleeves shall not be provided for piping running embedded in concrete or insulating concrete slabs on grade.

C. Where sleeves are placed in exterior walls below grade, the space between the pipes or conduit and the sleeves shall be packed with oakum and lead and made completely watertight.
D. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be large enough to pass the pipe and the insulation.
E. Sleeves shall be constructed of galvanized steel pipe unless otherwise indicated on the drawings.
F. Sleeves penetrating any fire-treated wall or assembly shall be filled with a material capable of maintaining the fire resistance rating.

1.23 Operating Instructions:

A. Upon completion of all work and all tests, Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period of four (4) hours, or as otherwise specified. During this period, instruct the Owner or there representative fully in the operation, adjustment and maintenance of all equipment furnished. Give at least forty-eight (48) hours written notice to the Owner in advance of this period.

B. This Contractor shall furnish to the Owner four (4) complete bound sets of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for review to the engineer, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.
   1. Format of the manual shall be as follows:
      a. First page: Title of project, Owner, address, date of submittal, name and address of contractor, name of Engineer.
      b. Second page: Index of manual contents.
      c. First section: A copy of each shop drawing and reviewed submittal with an index at the beginning of the section. Include operating and maintenance instructions, wiring/control diagrams, spare parts lists for each type of equipment.
      d. Second section: A list of all equipment, used on the job, together with supplier's name and address and the servicing agency's name and address.
      e. Third section: Written warranties and test certificates.
      f. Include special keys and wrenches.
      g. Reduced copy (11" x 7") of "As-Built" drawings.

C. The Contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this contract.

1.24 Record Drawings/As-Builts:

A. As part of the closeout documents, contractor shall provide the following as part of the as-built:
   1. As-built redline field set.
   2. As-built in PDF format.
   3. All equipment submittals in PDF format.
   4. Controls, point list, point list verification, sequence of operation in PDF format.
   5. Test and balance report in form of PDF.
   6. Two hard copies of the as-builts.
   7. Preventive Maintenance ,Spare devices, Filters and E.T.C

1.24 Product Delivery, Storage and Handling:

A. Arrange deliveries of products in accordance with construction schedules to avoid conflict with work and site conditions.
   1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
   2. Assure compliance with the requirements of the Contract documents and reviewed submittals, and that products are properly protected and undamaged.
   3. Provide equipment and personnel to handle products to prevent soiling or damage to products and packaging.

1.25 Project Conditions:

A. Locate existing utilities prior to beginning work. Re-route or replace existing utilities where necessary to permit installation of the work at no additional cost to the Owner. Provide adequate means of protection during work operations. Repair, at Contractor's expense, existing utilities damaged during work operation to the satisfaction of the Owner.
B. Should uncharted or incorrectly charted piping or other utilities be encountered during work operations, notify the Owner immediately for procedure directions. Cooperate with utility companies in maintaining active utilities in operation.

1.26 Quantities:

A. Items may be referred to as singular or plural on specifications. Contractor is responsible for determining quantity of each item.

1.27 Protection:

A. Protect equipment and materials during construction from being damaged by water, dirt, welding and cutting spatters, paint drippings, etc., by use of shield and drop cloths. Damaged equipment or materials shall be repaired or replaced by the Contractor.
B. During construction, maintain all materials and equipment in an orderly manner.
C. Protect floors from soil and damage caused by chips and cutting oil.

1.28 Cleaning:

A. Broom clean work area. Remove debris at least weekly and at completion of work.
B. Upon completion, equipment shall be thoroughly cleaned of dirt, grease, rust and oil, primed where necessary, and left ready for painting. Vacuum clean inside and outside of equipment cabinets.
C. Clean gauges, thermometers, traps, strainers and fittings.

END OF SECTION 230000

SECTION 230513 - MOTORS

PART 1 - GENERAL

1.1 Section Includes:

A. Three-phase electric motor.

1.2 Related Work:

A. Section 230514 - Variable Frequency Drive
B. Section 237313 – Central station Air Handling Unit

1.3 References:

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
B. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
C. ANSI/IEEE 112 -Test Procedure for Polyphase Induction Motors and Generators.
D. ANSI/NEMA MG 1 - Motors and Generators.
E. ANSI/NFPA 70 - National Electrical Code.

1.4 Operation and Maintenance Data:

A. Include assembly drawings, bearing data including replacement sizes and lubrication instructions.

PART 2 - PRODUCTS

2.1 Manufacturers:

Provide manufacturers standard as supplied with respective equipment.

2.2 General Construction and Requirements:

A. Electrical Service: Refer to Electrical specification for required electrical characteristics.
B. Motors: Designed for continuous operation in 40 degrees C. environment, and for temperature rise in accordance with ANSI/NEMA MG1 limits for insulation class, Service Factor and motor enclosure type.
C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, rpm, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency.
D. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide conduit connection in end frame.
E. Multiple Speed: Through tapped windings.
F. TEFC: Class F (50 degrees C. temperature rise) insulation, minimum 1.15 Service Factor, pre-lubricated ball bearings, automatic reset overload protector.

2.3 Three-Phase Power - Squirrel Cage Motors:

A. Starting Torque: Between one and one-half (1-1/2) times full load torque.
B. Starting Current: Six (6) times full load current.
C. Power Output, Locked Rotor Torque, Breakdown or Pullout Torque: NEMA Design B characteristics.
D. Design, Construction, Testing and Performance: Conform to ANSI/NEMA MG 1 for Design B motors.
E. Insulation System: NEMA Class ‘F’.
F. Testing Procedure: In accordance with ANSI.IEEE 112, Test Method B. Load test motors to determine freedom from electrical or mechanical defects and compliance with performance data.

G. Motor Frames: NEMA standard T-frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
H. Motors shall be equipped with phase protection.
I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for pre-lubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
J. Sound Power Levels: To ANSI/NEMA MG 1.
K. Nominal Efficiency: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
L. Nominal Power Factor: Meet or exceed values in Schedules at full load and rated voltage when tested in accordance with ANSI/IEEE 112.
M. Motors with frame sizes 184T (5HP) and larger shall be energy efficient type.

PART - 3 EXECUTION

3.1 Application:

A. Motors drawing less than 250 Watts and intended for intermittent service may be germane to equipment manufacturer and need not conform to these specifications.
B. Motors shall be TEFC type, except where specifically noted otherwise.
C. All three phase motors shall be equipped with phase protection.
D. All motors controlled by variable frequency drives (VFD) shall be type 'F' insulation.

End of Section 237313

SECTION 230514 - VARIABLE FREQUENCY DRIVE

PART 1 - GENERAL

1.1 Section Includes:

A. Variable Frequency Drives (VFD)

1.2 Related Work:

A. Section 230000 - General Mechanical
B. Section 230553 - Mechanical Identification
C. Section 237313 – Central Station Air Handling Unit

1.3 Submittals:

A. Submit shop drawings and product data under provisions of Section 230000.
B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
C. Submit electrical requirements for power supply wiring. Include diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.

1.4 Operation and Maintenance Data:

A. Submit operation and maintenance data under provisions of Section 230000.

1.5 Delivery, Storage, and Handling:

A. Deliver product to site in factory-fabricated protected containers, with factory-installed shipping skids and lifting lugs.
B. Store in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.6 Environmental Requirements:

A. Do not operate unit for any purpose, temporary or permanent, until system has been cleaned and tested under observation.

1.7 Warranty:

A. For a period of three (3) years after Owner's acceptance of project, the manufacturer and vendor shall correct product defects due to the following:
   1. Failure to comply with specifications.
   2. Faulty materials, equipment, applications, and other items.
   3. Faulty workmanship.
B. Defects corrected after energizing shall be accomplished at a time agreeable to Owner.
C. Product with defects shall be replaced or corrected without charge to Owner.
D. Installing Contractor to provide operation of unit at a minimum 40% load for 8 consecutive hours on each of 5 consecutive days minimum before start date of warranty period.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers:

A. ABB (Basis of Design)
B. Danfoss Graham

2.2 General:

A. Furnish variable frequency drives as specified herein to control the Fan Motor in Air Handling Unit designated on the drawings and schedules to be variable speed. All standard and optional features shall be included within the VFD enclosure, unless otherwise specified. VFD shall be housed in a metal NEMA Type 1 enclosure. The enclosure shall be hinged with all components accessible and changeable from the enclosure front. No rear access shall be permitted. All components shall be removed from the enclosure without requiring removal of the enclosure chassis.
B. Controlled acceleration and deceleration, independently set, shall be adjustable from 3 to 60 seconds with torque limit override protection. Torque limit override shall adjust the voltage and frequency to provide maximum starting capability and load shedding to prevent overload trips.
C. Minimum frequency shall be adjustable from 0 to 50% of base frequency.
D. Maximum frequency shall be adjustable from 110 to 50% of base frequency.
E. The VFD shall have automatic boost to provide overload capability at all frequencies and provide up to 100% starting torque.
F. The VFD shall have Hand/Auto/Off switch mounted on the enclosure door. In the Hand position, the door mounted potentiometer will control the VFD speed. In the Auto position, the VFD speed shall be controlled by a remote 4-20 mA DC isolated signal, and a remote start input. In the Off position, it shall not be possible to start the VFD. The door-mounted start and stop push-buttons shall provide control in the Hand mode and through BACnet interface/communication.
G. The VFD shall include a full-wave diode bridge rectified and maintain a fundamental power factor near unity regardless of speed or load.
H. The VFD and options shall be tested to ANSI/UL Standard 508. The complete VFD, including all specified options, shall be UL listed.
I. The VFD shall have a DC link reactor to minimize power line harmonics. VFD's without a DC link reactor shall provide 3% impedance input AC line reactors.
J. VFD’s full load amp rating shall meet or exceed NEC Table 430-150. VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 220% of rated current and up to 1 second while starting.
K. An automatic energy optimization selection feature shall be provided standard in the drive. This feature shall reduce voltages when lightly loaded and provide a 3% to 10% additional energy savings.
L. Input and output power circuit switching can be done without interlocks or damage to the VFD.

2.3 Protective Features:

A. VFD shall be designed to protect itself against all normal transients and surges from the incoming power lines, any groundings or disconnect of the output load, and any interruption or runaway of incoming speed reference signal. **Protection, herein, is defined as a programmed shutdown with no component damage, fuse blowing, or circuit breaker trips.**
B. VFD shall protect itself from all phase-to-phase and phase-to-ground faults of the VFD.

C. VFD shall be capable of starting into a spinning load with complete protection and promptly return the motor to set speed.
D. Instantaneous overcurrent trip shall continuously monitor peak currents and provide instantaneous shutdown without component failure when the high limit is surpassed.
E. Protect VFD from sustained power or phase loss. The VFD shall incorporate a 5 second control power loss ride through to eliminate nuisance tripping.
F. The VFD shall incorporate a motor preheat circuit to keep the motor warm and prevent condensation buildup.
G. Regardless of the VFD design, the drive shall be fitted with output line reactors.

2.4 Operating Conditions:

A. Ambient temperature, -10 to 40° C. (14 to 104° F.).
B. 0 to 95% relative humidity, non-condensing.
C. Elevation to 3,300 feet without derating.
D. AC line voltage variation, -10 to +10% of nominal with full output.
E. All power and control wiring shall be done from the bottom.

2.5 VFD Door-Mounted Devices:

A. Local/Hand, Stop/Reset and Remote/Auto selector switches shall be provided to start and stop the drive and determine the speed reference.
B. Provide a 24V DC, 40 mA Max., output signal to indicate that the drive is in Remote/Auto mode.
C. Digital manual speed control. Potentiometers are not acceptable.
D. Lockable, alpha-numeric backlit display keypad can be remotely mounted up to 10 feet away.
E. All displays shall be in English.
F. A red FAULT light and a green POWER-ON light shall be provided.
G. A quick setup menu with preset parameters shall be provided on the drive.
H. The drive shall be fitted with an RS 485 serial communications port and be supplied with software to display all monitoring, fault, alarm, and status signals. The software shall allow parameter changes to be made to the drive settings as well as storage of each controller's operating and setup parameters.
I. Set point control interface (PID control) shall be standard in the unit.
J. Floating point control interface shall be provided to increase/decrease speed in response to switch closures.
K. An elapsed time meter and kWh meter shall be provided.
L. The following displays shall be accessible from the control panel in actual units: Reference Signal Percent, Output Frequency, Output Amps, Motor HP, Motor kW, kWhr, Output Voltage, No Load Warning, DC Bus Voltage, Drive Temperature (% until trip) and Motor Speed in engineering units per application (in percent speed, GPM)
M. Drive will sense the loss of load and signal a no load/broken belt warning or fault.
N. The VFD shall store in memory the last 8 faults and record all operational data.
O. Eight programmable digital inputs shall be provided for interfacing with the systems control and safety interlock circuitry.
P. Two programmable relay outputs shall be provided for remote indication of drive status.
Q. Two programmable analog inputs shall be provided and shall accept a direct-or-reverse acting signal. Analog reference inputs accepted shall include 0-10 V dc, 0-20 mA and 4-20 mA.
R. Two programmable analog outputs shall be provided for indication of drive status. These outputs shall be programmable for output speed, voltage, frequency, amps and input kW.
S. Under fire mode conditions the VFD shall have the capability to automatically default to a preset speed.

2.6 Adjustments:

A. VFD shall have an adjustable carrier frequency of 2 to 14 kHz.
B. Three variable-torque V/Hz patterns shall be provided with the ability to select a constant torque start pattern for each of them.
C. Twenty preset speeds shall be provided.
D. Eight acceleration and eight deceleration ramps shall be provided. The shape of these curves shall be adjustable.
E. Four current limit settings shall be provided.
F. If VFD trips on one of the following conditions, the VFD shall be programmable for automatic or manual reset: undervoltage, overvoltage, current limit, inverter overload and motor overload.
G. The number of restart attempts shall be selectable from 0 through 10 and the time between attempts shall be adjustable from 0 through 10 seconds.

2.7 Bypass:

A. Provide a UL listed manual bypass consisting of a door interlocked main fused disconnect (circuit breakers not acceptable) padlock able in the off position, a built-in motor starter and a four position DRIVE/OFF/LINE/TEST switch controlling three contactors. In the DRIVE position, the motor is operated at an adjustable speed from the drive. In the OFF position, the motor and drive are disconnected. In the LINE position, the motor is operated at full speed from the AC power line and power is disconnected from the drive, so that service can be performed. In the TEST position, the motor is operated at full speed from the AC line power. This allows the drive to be given an operational test while continuing to run the motor at full speed in bypass. Customer supplied normally closed dry contact shall be interlocked with the drive's safety trip circuitry to stop the motor whether in DRIVE or BYPASS mode in case of an external safety fault.

2.8 Quality Assurance:

A. To ensure quality and minimize infantile failures at the job site, the complete VFD shall be tested by the manufacturer. The VFD shall operate a dynamometer at full load and the load and speed shall be cycled during the test.

PART 3 - EXECUTION

3.1 Operation:

A. VFD shall control operation of AHU-1 fan and provide soft start for AHU-2 and shall be interlocked with the DDC panel.
B. The high and low limits of operation on VFD shall correspond to max./min. RPM on the motor tested on site.
C. Mechanical contractor shall coordinate the proper operation of this device with the Automatic Temperature Control Contractor and Test & Balance Contractor as well as the representative of VFD manufacturer.

3.2 Install VFD in accordance with drive manufacturer’s instructions.

3.3 Mount VFD on vibration-free wall or rigidly supported frame.

3.4 Provide mechanical disconnect between VFD and motor if required by code (if the disconnect is not equipped on the unit).

3.5 Provide power wiring between VFD output and motor.

3.6 Provide termination strip for Temperature Control contractor to terminate remote control devices and safety interlocks.

3.7 Provide BACnet communications wire, hardware, and software.

3.8 Provide service of drive manufacturer's factory representative to perform in-unit checkout, start-up, and Owner training. This training shall be part of the final training to the Owner provided by manufacturer and the Mechanical Contractor after acceptance of the completion of the project by the Owner. Start-up report signed by the manufacturer shall be part of the close-out documents.

END OF SECTION 230514

SECTION 230519 – HYDRONIC SPECIALTIES

PART 1 - GENERAL

1.1 Description of Work

A. **Extent** of hydronic specialties required by this section is indicated on drawings and/or specified in other Division-15 Sections.
B. **Types** of hydronic specialties specified in this section include the following:
   1. Dielectric Unions
   2. Pressure Gauges
   3. Air Vents
   5. Strainers

1.2 Quality Assurance

Manufacturers:

Firms regularly engaged in the manufacture of hydronic specialties of the types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

1.3 Submittals

Product Data:

Submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of manufactured hydronic specialty. Include pressure drop curve or chart for each type and size of hydronic specialty. Submit schedule showing manufacturer's figure number, size, location, and features for each required hydronic specialty.

PART 2 - PRODUCTS

2.1 Manufactured Hydronic Specialties

General:

Provide factory-fabricated hydronic specialties recommended by manufacturer for use in service indicated. Provide hydronic 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, and equipment connections.

2.2 Dielectric Unions

Subject to compliance with requirements, provide dielectric unions of one of the following manufacturers:

A. Capital Mfg. Co., Div. Of Harsco Corp.
B. Epco Sales, Inc.
C. PSI Industries

2.3 Pressure Gauges

Provide and install pressure gauges by Weksler, Type AA14, Gauge 1% accuracy, 4-1/2" dial size with white background, corrosion resistant stainless steel case and ring, plastic lens, soft-soldered phosphor bronze tube with brass socket "1/4" N.P.T. bottom connection.

Model No.	Range (psi)	Service
AA14-C	0 – 15	Chilled Water Supply & Return

Consult manufacturer on size of tubing, valves, and installation. Assembly shall be piped in such a manner as to be utilized by the Test and Balance Contractor without removing the gauge. See detail on the drawing.
NOTE: Gauge shall be screwed into the well. Well to be provided as part of the gauge.

2.5 Air Vents

Armtrol/Thrush heavy duty automatic air eliminators, 75 psig and 240 degrees F. maximum pressure and temperature.
Optional Manufacturers:
A. Taco
B. Bell & Gossett

2.6 Strainer

Install strainer in vertical configuration (parallel to flow), cast iron 'Y'- type strainer with screen having 1/8" perforations per square inch, by Keckly, per following table.

PART 3 - EXECUTION

3.1 General

Install hydronic specialties in accordance with the manufacturer's recommendations and requirements of the project, as indicated. Insulate hydronic specialties in chilled water service.

3.2 Dielectric Union

A. Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.

3.3 Pressure Gauge

All gauges for the AHU coil shall be installed in the chilled water supply and return piping with isolation valves upstream.

3.5 Air Vent

Install at the top of each riser of more than five (5) feet of each heat transfer device (i.e., chilled water coil) or vertical piping change of ten (10) feet or more.

3.6 Strainer
Strainer shall be installed chilled water supply pipe into the chilled water coil. Installation shall allow for access for strainer removal. Provide and install isolation valves on each side of the strainer.

END OF SECTION 230519

SECTION 230523 - VALVES

PART 1 - GENERAL

NOTE: All requirements of this section shall comply with Section 230000.

1.1 Description of Work:

A. **EXTENT** of valve required by this section is indicated on drawings and/or specified in other Division- 23 sections.
B. **TYPES OF VALVE** specified in this section include the following:
   1. Butterfly Valve
   2. Drain or Vent Service
   3. Ball Valve
   4. Check Valve
C. **VALVE** furnished as a part of factory-fabricated equipment, are specified as part of the equipment assembly in Equipment Schedule.

1.2 Quality Assurance:

MANUFACTURERS: firms regularly engaged in the manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

1.3 Fabrication Of Valve:

Comply with MSS SP-25.

1.4 Valve Type:

Provide valve of same type by same manufacturer.

1.5 Submittals:

PRODUCT DATA: submit catalog cuts, specifications, installation instructions, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location, and valve features for each required valve.

1.6 Maintenance Data:

Submit maintenance data and spare parts lists for each type of valve. Include data in Maintenance Manual.

PART 2 - PRODUCTS

2.1 Valve - General Requirements:

GENERAL: Provide factory-fabricated valve recommended by manufacturer for use in service indicated. Provide valve of type and pressure rating indicated; provide proper selection as determined by installer to comply with installation requirements. Provide size as indicated, and connection that properly mates with pipe, tube, and equipment connections. Where more than one (1) type is indicated, selection is installer's option.

2.2 Packing:

Select valve designed for repacking under pressure when fully opened, equipped with packing suitable for intended service.

COMPLY with the following standards:

A. BALL VALVE:
Size: 1-1/2" and smaller - Grinnell threaded brass ball valve. Apply dielectric union on each end, standard lever with vinyl grip.

PART 3 - EXECUTION

3.1 Installation:

GENERAL: Except as otherwise indicated, comply with the following requirements:
A. Install valve where required for proper operation of piping and equipment, including valve in branch lines where necessary to isolate sections of piping. Locate valve to be accessible.
B. Valves installed at 54” AFF to be installed in the vertical position.

3.2 Insulation:

A. Where insulation is indicated install extended-stem valve arranged in proper manner to receive insulation.
B. Verify the proper operation of each valve before installation of insulation.
C. Each valve shall be properly tagged with I.D.#. The valve schedule shall be laminated, mounted in an aluminum frame, and installed in each mechanical room.

3.3 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.

END OF SECTION 230523

SECTION 230529 – SUPPORTS, ANCHORS, & SEALS

PART 1 - GENERAL

1.1 Description of Work:

A. **EXTENT** of supports, anchors, and seals required by this section are indicated on drawings, all requirements of this section shall comply with section 230000.
B. **TYPES** of supports, anchors, and seals specified in this section include the following:
1. Horizontal-Piping Hanger and Support
2. Vertical-Piping Clamp
3. Building Attachment
4. Miscellaneous Material
5. Anchor
6. Equipment Base
7. Equipment Foundation
8. Pipe Support Bracket

1.2 Quality Assurance:

MANUFACTURERS - Firms regularly engaged in the manufacture of supports, anchors and seals, of types and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

1.3 Code Compliance:

Comply with applicable codes pertaining to product materials and installation of supports, anchors and seals.

1.4 Submittals:

NOTE: All requirements of this section shall comply with Section 15000.

PRODUCT DATA - Submit catalog cuts, specifications, installation instructions and dimensioned drawings for each type of support, anchor and seal.

PART 2 - PRODUCTS

2.1 Horizontal - Piping Hangers And Supports:

GENERAL - Except as otherwise indicated, provide factory-fabricated horizontal-piping hanger and support complying with ANSI/MSS SP58, one of the following MSS types listed, selected by installer to suit horizontal-piping systems, in accordance with MSS SP-60 and manufacturer's published product information. Use only one type by one manufacture for each piping service. Select size of hanger and support 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 hanger and support for copper piping system.

2.2 Adjustable Steel Clevis**:** MSS Type 1

2.3 Steel Pipe Clamp: MSS Type 4

2.4 Pipe Hanger: MSS Type 5

2.5 Vertical - Piping Clamp:

GENERAL - Except as otherwise indicated, provide factory-fabricated vertical piping clamp complying with ANSI/MSS SP-58, of one (1) of the following types listed, selected by the installer to suit vertical piping system, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamp to exactly fit pipe size and bar pipe. Provide copper-plated clamp for copper piping system.

2.6 Bolt Riser Clamp: MSS Type 8

2.7 Hanger-Rod Attachment:
Attachment complying with ANSI/MSS SP-58, selected by the installer for approval by the Engineer to suit horizontal-piping hanger and building attachment, in accordance with MSS SP-69 and the manufacturer's published product information. Use only one (1) type by one (1) manufacturer for each piping service. Select size of hanger-rod attachment to suit hanger rod.

2.8 Building Attachment:

GENERAL - Except as otherwise indicated, provide factory-fabricated building attachment complying with ANSI/MSS SP-58, one (1) of the following MSS types listed, selected by installer to suit building substrate conditions, in accordance with MSS SP-69 and the manufacturer's published product information. Select size of building attachment to suit hanger rod. Provide copper-plated building attachment for copper piping system.

2.9 Steel Bracket: One of the following for indicated loading:

LIGHT DUTY:	MSS TYPE 31
SIDE BEAM BRACKET:	MSS TYPE 34
TOP BEAM C-CLAMP:	MSS TYPE 19
C-CLAMP:	MSS TYPE 23

2.10 Manufacturer of Hanger and Support:

MANUFACTURER - Subject to compliance with requirements, provided hanger and support are one of the followings:
A. B-LINE
B. C & S MANUFACTURING COMPANY
C. F & S MANUFACTURING CORPORATION
D. FEE & MASON MANUFACTURING COMPANY
E. ITT GRINNELL CORPORATION

2.11 Wall-Mounted Bracket:

Steel material, plain finish, by Bline Products, Part #B3063-2. This type of bracket is to be mounted on the wall for pipe support.

PART 3 - EXECUTION

3.1 Prior To Installation:

Before installation of hanger, support, anchor and associated work: Installer shall meet at project site with the Contractor, the installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and the Engineer for the purpose of reviewing material selection and procedures to be followed in performing the work in compliance with requirements specified.

3.2 Vertical Piping:

Provide vertical pipe support as indicated on the drawing; explicitly at suction and discharge elbows of the chilled water pump

3.3 Installation Of Hanger, Support, Building Attachment, & Equipment Bases:

A. GENERAL - Install hanger, support, clamp, and attachment 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 hanger where possible. Install support with maximum spacing complying with MSS SP-69. Where piping of various sizes is to be supported together by a trapeze hanger, space hanger for smallest pipe size or install intermediate support for smallest diameter pipe. *DO NOT* use wire or perforated metal to support piping, and *DO NOT* support piping from other piping.

B. HANGER AND SUPPORT - Install hanger and support complete with necessary insert, bolt, rod, nut, washer and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hanger and support of same type and style as installed for adjacent similar piping.

C. Prevent electrolysis in support of copper tubing by use of hanger and support that are copper-plated, or by other recognized industry method.

D. INSULATED PIPING - Provide a shield where low compressive-strength insulation or vapor barrier is required; install coated protective shield.

E. ADJUSTMENT HANGER AND SUPPORT - Adjust hanger and support to bring piping to proper level and elevation.

F. EQUIPMENT BASE - Provide concrete housekeeping base for the floor- mounted equipment furnished as part of the work of Division 23. Size the base to extend a minimum of 4" beyond equipment base, in any direction, and 6" above finished floor elevation. Construct base of reinforced concrete; roughen floor slab beneath base for bond and provide steel rod anchor between floor and base. Locate anchor bolt using equipment manufacturer's template. Chamfer top and edge corners.

NOTE: Provide structural steel stand to support equipment not floor-mounted or hung from structure. Construct stand of structural steel members of steel pipe and fittings.

G. EQUIPMENT FOUNDATIONS – Refer to structural specifications and drawings.

END OF SECTION 230529

SECTION 230553 - MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 Work Included

Identification of Mechanical Products Installed Under Section 23 – Heating, Ventilation, & Air Conditioning and Division 1.

1.2 Related Work

A. Section 232113 .....Chilled Water Piping – Schedule 40 Iron
B. Section 230514 .....Variable Frequency Drive
C. Section 230900 .....DDC Controls
D. Section 2373130 .....Central Station Air Handling Unit

1.3 References

ANSI/ASME A13.1—Scheme for the Identification of Piping Systems.

1.4 Submittals

A. Submit product data under requirements of section 23, Heating, Ventilation, & Air Conditioning.
B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 - PRODUCTS

2.1 Acceptable Manufacturers

A. Brady
B. Seton
C. MSI

2.2 Materials

A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1. Exact colors, which are used in combination with legends, are contained in the ANSI Z535.1 Safety Color Code.
B. Metal Tags: 18 gauge brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Colors shall comply with ANSI/ASME A13.1. Size markers and letters as follows:

Outside Diameter of Pipe or Insulation	Length of Color Field	Height of Letters
3/4" - 2"	1"x8"	3/4"
2-1/2" - 6"	2-1/4"x13"	1-3/4"
8" - 10"	4"x24"	2-1/2"
10" or Larger	4"x32"	3-1/2"

D. Plastic Flagging Tape: 1-3/16” wide, bright orange.

E. Plastic Equipment Markers: 2" x 4", minimum 1/8" thick, corrosive and chemical resistant, black with white letters. Minimum size letter shall be 1/4". Fasten with stainless steel hardware.
F. Equipment Locator Tacks: 7/8" diameter color coded with push tack and writable surface.

PART 3 - EXECUTION

3.1 Preparation

Degrease and clean surfaces to receive adhesive for identification materials.

3.2 Installation

A. Metal Tags: Install with heavy brass hook or chain.
B. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.
C. Equipment: Identify AHU's, VFD's, Control Panels, Control Valves, Net Sensors, and all other devices or equipment scheduled or specified.
D. Controls: Identify control panels and major control components outside panels with plastic equipment tags.
E. Valves: Identify valves associated with operation of Chiller (CH-10).
F. Piping: Identify piping, concealed or exposed, with plastic pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, & BALANCING

PART 1 - SPECIAL PROVISIONS

1.1 Drawings and Specifications:

A. The drawings and specifications made herein will be contained in the complete contract documents prepared for the project. The project documents may be inspected at the office of the Engineer.
B. The "Instructions to Bidder" and "General Requirements" of the project specifications are a part of these specifications as stated above, whether attached thereto or not. It shall be the balancing agency's responsibility to properly coordinate the requirements of these provisions with the Contractor.

1.2 General:

A. Contractor will select and employ an impartial, independent balancing agency to provide testing and balancing services for the hydronic systems of this project; these services will be paid for by the Contractor. Mechanical contractor shall obtain the services of a pre-approved T&B agency with the University of South Florida.
B. The balancing agency will have a contractual relationship with all parties involved for the satisfactory execution of testing and balancing the hydronic systems.
C. The balancing agency is advised that the project, by the terms of the contract with the Contractor, is to be completed within the specified number of calendar days. Any extension of time shall be a provided in the specifications and shall be granted by the Owner.
D. The schedule for testing and balancing the hydronic systems shall be established by the Contractor in coordination with the balancing agency. It is the balancing agency's responsibility to initiate this continuing coordination to determine his schedule for final testing and balancing services and the period inspections required during construction.

1.3 Qualifications of The Balancing Agency:

A. The test and balance of hydronic systems shall be performed by an independent test and balance agency selected by the Contractor. This Section of the Specifications, providing for coordination between this Contractor and the test and balance agency, indicates the minimum scope of services to be supplied by the (Mechanical) Contractor and the minimum services to be provided by the test and balance agency, as well as the responsibilities of this (Mechanical) Contractor.
B. This certified test-and-balance engineer shall be responsible for supervision and certification for the total work herein specified.
C. The balancing agency shall submit records of experience in the field of air and hydronic system balancing or any other data as requested by the Owner. The supervisory personnel for the firm shall have at least five (5) years' experience, and all the technicians performing work on this project shall be qualified in their trade and specific task.
D. The balancing agency shall furnish all necessary calibrated instrumentation to adequately perform the specified services. An inventory of all instruments and devices in possession of the balancing agency may be required by the Owner to determine the balancing agency's performance capability.
E. The balancing agency shall have operated for a minimum of five (5) years under its current name.

1.4 Standards:

The test and balance agency has agreed, or shall agree, to carry out the test and balance in accordance with the AABC National Standards for Total Systems Balance, 1982, or the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, Fourth edition, and in conformance with ASHRAE Handbook, 1986, Chapter 37, Testing, Adjusting and Balancing, and as outlined in this Specification Section.

1.5 Documents:

A. The architect/engineer or installing contractor will provide the balancing agency one (1) copy of the following documents.
   1. Project drawings (mechanical) and specifications.
   2. Approved construction revisions pertaining to the hydronic systems.
   3. Reviewed submittal data on hydronic equipment and systems to be installed by the Mechanical Subcontractor.
   4. Reviewed shop drawings.
   5. Reviewed wiring diagrams, control diagrams, and equipment cut-sheets, as appropriate.

1.6 Coordination:

A. It will be necessary for the balancing agency to perform its services in close coordination with the Mechanical and Control Subcontractors in addition to the chiller start up technician.
B. The plans and specifications have indicated gauges, valves, and other devices for adjusting the system to obtain optimum operating conditions. It will be the responsibility of the Mechanical Contractor to install these devices in a manner that will leave the devices accessible, readily adjustable, and operational as the design intended. The balancing agency shall provide guidance if there is a questionable arrangement of a control or balancing device.
C. The Contractor, Mechanical Contractor, Control Subcontractor, and the suppliers of the hydronic equipment shall all cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components. In addition, they shall furnish all labor and materials required to eliminate any system deficiencies.

1.7 Responsibilities of The Mechanical Contractor:

A. The Mechanical Contractor shall complete the installation and start all HVAC systems to ensure they are working properly, and shall perform all other items as described hereinafter to assist the balancing agency in performing the testing and balancing of the HVAC systems.
B. Water Circulating Systems:
   1. Verify installation for conformity to design.
   2. Check the pump to verify pump alignment and rotation.
   3. Ensure that system is clean, with the proper strainer screens installed for normal operation.
   4. Check the pump motor for current and voltage, to ensure that motor does not exceed nameplate rating.
   5. Provide overload protection of proper size and rating.
   6. Ensure that the water circulating system is full and free of air; that all air vents were installed at high points of systems and are operating.
   7. Check and set operating temperatures of the chiller to design requirements.

1.8 Responsibilities of Control Contractor:

A. The Temperature Control Contractor shall complete the installation of the temperature control system and operate and test all control systems to ensure they are functioning properly as designed. The Control Contractor shall assist the balancing agency in testing and balancing the Hydronic systems, as described hereinafter.
   1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, control valves, DP switches, flow meters, gauges, etc..
   2. Verify that all controlling instruments are calibrated and set for design operating conditions.
   3. Calibrate all devices and sensors and provide final adjustment.
   4. The Control Contractor shall allow sufficient time in the project to provide instruction to the balancing agency in the proper use and setting of control components such as, but not limited to, computers, pressure controllers, or any other devices that may need set point changed so that the testing and balancing work can be performed.
   5. Document in control software the Test and Balance set points, i.e. O/A damper position, etc.
   6. Coordinate with manufacturers start up technician to ensure chiller's control center readings are concurrent within tolerances of the external sensors and gauges.

1.9 Notification for Testing and Balancing Work to Begin:

A. The Contractor shall notify the balancing agency, in writing, when all heating, ventilating, and air conditioning systems are complete and ready for testing and balancing. The Mechanical Contractor shall attest that he has completed all items as described in Section 1.07 of these specifications.
B. If upon commencing the work the Test & Balance Contractor finds that the systems are not ready, or if a dispute occurs as to the readiness of the systems, the balancing agency shall request an inspection to be made by the Mechanical Engineer. This inspection shall establish, to the satisfaction of the represented parties, whether the system meets the basic requirements for testing and balancing. Should the inspection reveal the notification to have been premature, all costs for the inspection and work previously accomplished by the balancing agency shall be paid for by the Contractor. Furthermore, such items that are not ready for testing and balancing shall be completed and placed in operational readiness before testing and balancing service shall again be requested.

1.10 Quantities:

A. In all cases where a device, operation, procedure, tool equipment, or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the testing and balancing specified herein.

1.11 Insurance:

A. As required by the Owner through the contractor.

PART 2
BALANCING SPECIFICATIONS AND RESPONSIBILITIES OF BALANCING AGENCY

2.1 Scope:

A. In accordance with Project Drawings and Specifications and as specified herein, the balancing agency shall provide all supervision, personnel, instruments, calibration equipment, and all other materials and services necessary to perform all testing and balancing of the hydronic system. All test data, including all pertinent calculations, shall be reported on appropriate forms in accordance with industry standards and regulations.
B. The Test & Balance report shall indicate, the month, day, year, & outdoor air temperature on the day of testing.

2.2 General:

A. The testing and balancing of the heating, ventilating, and air conditioning system shall be performed by an independent balancing agency approved by the Owner/ Engineer. The balancing agency shall have a minimum of five (5) year's specialized experience in air and hydronic system balancing, and possess calibrated instruments, qualified test-and-balance engineers, and skilled technicians to perform all required tests.
B. The tests shall demonstrate the specified capacities and operation of the equipment and materials comprising the systems. The balancing agency shall then make available to the owner's representative such instruments and technicians as are required for "spot checks" of the system.
C. The balancing agency shall not instruct or direct the Mechanical Contractor in any of the work. Any proposed changes or revision in the work shall be submitted to the Contractor in writing.

2.3 Services:

A. During construction, the balancing agency shall inspect the installation of pipe systems, chiller, pump, controllers, temperature controls, and other component parts of the hydronic system. The inspections shall be performed periodically as the work progresses. A minimum of two (2) inspections is required as follows:
   1. When sixty percent (60%) of the work is completed for each phase.
   2. When ninety percent (90%) of the work is completed for each phase.
B. Upon completion of the installation and start-up of the mechanical equipment by the Mechanical Contractor, the balancing agency shall test and balance the system to the requirements of the specifications.

2.4 Chilled Water Procedures:

A. The chilled water circulating system shall be filled, purged of air, and put into operation before hydronic balancing by the Mechanical Contractor.
B. The balancing agency shall perform the following testing and balancing functions in accordance with the AABC National Standards:
   1. **STRAINERS** - request that the Mechanical Contractor clean the strainers.
   3. **AIR VENTS** - check all air vents at the high points of the water system and determine if they are installed and operating.
   3. **VALVES** – The owner has chosen to utilize isolation valves for means of balancing the chilled water flow. Upon verification of design flow the valve shall be marked for the operators use as a balancing point.
   4. **TOLERANCES** - proceed to balance all chilled water coils within ten percent (10%) of design requirements.
   5. **MARKING** - mark all settings and record all data after completing the flow readings and coil adjustments.

2.6 Special Systems Procedures:

A. Procedures: N/A

2.7 Verification of Temperature Control:

A. The balancing agency shall be assisted by the Temperature Control Contractor in verifying the operation and calibration of all temperature control systems. The following tests shall be conducted:
   1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, valve actuators, gauges, etc.
   2. Verify that all controlling instruments are calibrated and set for design operating conditions.
   3. Verify the accuracy of the final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.

2.8 Test and Balance Report:

A. The test and balance report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed on white bond paper and bound. The report shall be certified accurate and complete by the balancing agency's certified test and balance engineer.
B. (1) .PDF copy of the Test and Balance Report are required and shall be submitted to the Contractor.

C. The report shall contain the following general data in a format selected by the balancing agency:
   1. Project number.
   2. Contract number.
   3. Project title.
   4. Project location.
   6. Project Mechanical Engineer.
   7. Test & Balance agency
   8. Test & Balance Engineer.
   9. Construction Manager
   10. Mechanical Subcontractor.
   11. Dates tests were performed.
   12. Certification.

D. The test and balance report shall be recorded on report forms conforming to the industry recommended forms and standards. At a minimum, the report shall include:
   1. **Preface** - A general discussion of the system, and any abnormalities and problems encountered.
   2. **Instrumentation List** - The list of instruments including type, model, manufacturer, serial number, and calibration dates.
   3. **System Identification** – Identify all components of the system within the scope of Test & Balance AHU's, VAV's, Control Valves, Etc.
      a. Manufacturer, model number, and serial number.
      b. All design and manufacturers' rated data.
      c. Rated, and actual pressure drop across evaporator.
      d. Entering and leaving water temperatures.
      e. Rated and actual operating current and voltage.

2.9 Final Acceptance:

A. At the time of final inspection, the balancing agency shall re-check, in the presence of the Owner's representative, specific and random selections of data recorded in the certified test and balance report.
B. Points and areas for re-check shall be selected by the Owner's representative.
C. Measurements and test procedures shall be the same as the original test and balance.
D. Final report shall indicate the percent deviation between design value and actual recorded.
E. If random tests demonstrate a measured flow deviation of ten percent (10%) or more from that recorded in the certified test and balance report, the report shall automatically be rejected. In the event the report is rejected all systems shall be readjusted and tested, new data recorded, a new certified test and balance report submitted, and a new inspection test made, all at no additional cost to the Owner.

END OF SECTION 230593

SECTION 230713 - MECHANICAL INSULATION

NOTE:
All requirements of this section shall comply with Section 230000 - General Mechanical.

PART 1 - GENERAL

1.1 Description Of Work:

A. **EXTENT** of mechanical insulation required by this section is indicated on drawings, and by requirements of this section.

B. **TYPES** of mechanical insulation specified in this section include the following:
1. Exposed Chilled Water Piping System.
2. Hydronic specialties.

1.2 Quality Assurance:

MANUFACTURERS - Firms regularly engaged in the manufacture of mechanical insulation products of types and sizes required, whose products have been in satisfactory use in similar service not less than three (3) years.

1.3 Manufacturer:
Subject to compliance with requirements, provide products of one of the following:

A. Manville Products Corporation

B. Pittsburgh Corning Corporation or Approved Equal

C. Armstrong World Industries, Inc.

1.4 Installer:

A firm with at least five (5) years' successful installation experience on projects with mechanical insulation similar to that required for this project.

1.5 Flame/Smoke Ratings:

Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastic and adhesives) with flame-spread rating of 25 or less, and smoke developed rating of 50 or less, as tested ANSI/ASTM E-84 (NFPA 255) method.

1.6 Submittals:

A. **Product Data:** Submit manufacturer's specifications and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, thickness, and furnished accessories for each mechanical system requiring insulation.
B. **Certifications:** Submit certifications to show compliance with these specifications and governing regulations.
C. **Product Delivery, Storage, And Handling:**
1. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label affixed showing fire hazard rating of products.
2. Protect insulation against dirt, water and chemical and mechanical damage. *Do not install damaged insulation*. All damaged insulation shall be removed from the project site.

PART 2 - PRODUCTS

2.1 Pipe Insulation Materials:

A. **Cellular Glass Insulation (Chilled Water):** Provide TYPE "A" foamglass fiber insulation ANSI/ASTM C547.
B. **Vapor Barrier Jackets:** Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
C. **Adhesives, Sealers and Protective Finishes:** As recommended by insulation manufacturer for applications indicated.

PART 3 – EXECUTION

3.1 Chilled Water Piping Insulation:

A. **Application Requirements:** Insulate all new exposed chilled/hot water supply and return piping, valves and fittings and hydronic specialties.
B. **Insulation:** Cellular glass insulation, 2" thick (Chilled Water).
C. **Insulation:** Foamglass, 1” thick (Hot Water).

3.2 Protection and Replacement**:**

A. **Protection:** Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.
B. **Replace** damaged insulation that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture-saturated units.
C. **All** piping insulation shall be covered with aluminum jacketing.

3.3 Installation of Piping Insulation:

A. **General:** Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
B. **Install** insulation on pipe systems subsequent to testing and acceptance of tests.
C. **Install** insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete the run. *Do not use cut pieces or scraps abutting.*
D. **Clean and Dry** pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered. *DO NOT install insulation on wet or sweating chilled water pipe.*
E. **Maintain** integrity of vapor-barrier jackets on pipe insulation, and protect from puncture or other damage.
F. **Provide** factory-fabricated fitting covers for valves, fittings, pump housing, and similar items in each piping system with equivalent thickness and insulating value as adjoining pipe run.
G. **Extend** piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
H. **Install** protective metal shields and insulated inserts wherever needed to prevent compression of insulation. All exposed outdoor pipes shall be protected with aluminum jacket properly strapped at each joint.
I. **Pipe Hanger Insulation Inserts:** Butt pipe insulation against pipe hanger insulation inserts. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3-inch wide vapor barrier tape or band.
J. **Provide** removable covers for strainer assembly.

END OF SECTION 230713

SECTION 230900 – DDC CONTROLS

Part 1 – GENERAL

1.1 BASIC REQUIREMENTS

A. Provide all labor, materials, programming, and supervision necessary to install a fully functional and operating Distributed Digital Control system (DDC) utilizing electronic actuation.
   1. Minor devices, interlocks, programming, and installation details necessary to make the DDC system fully functional are to be included in this Scope of Work whether the specific items are specifically referenced herein.
   2. The Project Architect/Engineer (PA/E) shall have the sole authority to determine if items not specifically included within this specification section are minor or significant and/or outside of this intended scope of work.

B. Electrical control and interlock wiring connected to the DDC controls and associated instrumentation systems shall be furnished by the Controls Contractor.
   1. Power (110 VAC circuits or higher, low voltage circuits, transformers, wiring, conduits, etc.) to DDC controllers shall be provided by the Controls Contractor.
   2. All 110 VAC or greater work shall be completed by a State of Florida licensed electrical contractor.
   3. Equipment safety interlocks shall be 110 VAC.
      a. Sensing devices shall be provided by the Controls Contractor.
      b. 110 VAC wiring shall be by the Controls Contractor.
      c. Unless auxiliary contacts are required for interfacing device status to the DDC system, all safety devices shall be independent of the DDC system.

C. The DDC system shall consist of multiple digital controllers distributed throughout the facility; interconnected using new communication network; and programmed to maximize the integrity of the operational sub-systems being controlled.
   1. Provide stand-alone distributed controllers selected and deployed to coincide with the operating sub-systems being controlled.
   2. All reasonable efforts shall be made to ensure single controller failures shall affect only the sub-system being controlled.
   3. Master/Slave or Centralized Controller configurations shall not be accepted.
      a. All reasonable efforts shall be made to insure normal sub-system operating parameters reside at the distributed controllers and not at a higher-level device to enhance the operating integrity of the DDC sub-systems in the event of a network communications failure.
      b. Software shall be provided to allow distributed controllers to operate in a basic default control mode in the event of communication network failure.

1.2 RELATED SECTIONS

A. General Conditions.
B. Section 230000 .....General Mechanical Specifications.
C. This Specification Section and all its Parts, including:
   1. PART 1, General.
   2. PART 2, Products.
      a. Paragraphs 2.01 to 2.04 – Digital Network
      b. Paragraph 2.05 – Field Devices
   3. PART 3, Execution.

4. PART 4, Sequence of Operations.
5. PART 5, Operator Interfaces, Graphics, and Trending.

1.3 COORDINATION WITH OTHER TRADES AND ENTITIES

A. Provide coordination with others to include, but not be limited to:
   1. New wall-mounted sensor to be at the locations shown. The Control Contractor shall be fully responsible for coordination of all sensor locations with furniture cabinets, equipment, copiers, etc.
   2. Temporary controls to facilitate construction and/or required dry out support as interior finishes and materials are being installed – it shall be the responsibility of the Controls Contractor to coordinate temporary control requirements to this end;
   3. Assist the Engineer to validate compliance with requirements of the plans and specifications;
   4. Coordinate and reuse existing conduit layouts and routing at the site.

1.4 SCOPE OF WORK

Refer to the bid documents and the drawings for the scope of controls.

1.5 SHOP DRAWING SUBMITTAL REQUIREMENTS

A. After award of the Project Construction Contract, and prior to delivering submittals and shop drawings. The Contractor is to attend a pre-construction meeting with the owner and the Engineer. The purpose of the pre-construction conference is to review the proposed control system digital network architecture and to discuss the sequence of construction activities. It shall be the responsibility of the Controls Contractor to coordinate this meeting.

B. Submit five (5) copies of the following data/information for approval (prior to ordering any hardware or software items). Wherein this criterion differs from requirements of Related Sections, the more stringent criteria shall prevail unless otherwise directed in writing by the Project Engineer:

   1. An overall digital system digital communication network architecture diagram showing (existing and new, as applicable):
      a. All digital devices (Field Panels, and LAN devices). Use unique panel identifiers for each panel submitted.
      b. Communication transducers (fiber to copper, copper to fiber, etc.).
      c. Identify entry point into the Owner's intranet.
      d. Power/surge protection locations.
      e. Uninterrupted Power Supply (UPS).
      f. Other pertinent devices residing on the digital communication network.
   2. Physical Distributed Panel Locations:
      a. Building floor plans.
      b. Use unique identifiers for each existing panel submitted cross referenced to the network architecture diagram.
      c. Identify the digital panel type.
      d. Use a clearly thought out numbering scheme that would assist in identifying panel locations (for example: use 1-2-xx for panels in Building 1, second floor, panel XX).
      e. Clarify the numbering scheme or conventions used on the interconnect diagram and the floor plan panel locations.
   3. A detailed point-to-point diagram for each DDC panel:
      a. Submit on a per distributed panel basis (typicals are acceptable provided all applicable units are listed, exceptions noted, and the units are identified).

b. Include each I/O point, communication connection, and power inputs to the panels.
c. Provide a means to cross reference the I/O points to field device cut sheets.

4. Cut Sheets showing the performance data for all devices. Clearly mark the specific model and options to be provided. Include; but not limited to:
   a. Digital Panel data (indicate whether programmable or configurable, show power requirements, A/D conversion resolution, D/A conversion resolution, panel capabilities, etc.).
   b. Thermostat and other field sensor data (show accuracy, installation details, dimensions, weight, and other pertinent data relevant to the devices to be used).
5. A detailed Sequence of Operations for each distributed panel.
6. A description of the methodology used to keep graphics files on various PC terminals updated and consistent with one another (remote computer graphics vs. site computer).

C. Provide the Submittal per the following:
   1. Provide in a bound formatted 3-ring binder.
   2. Provide a Table of Contents and tabs for each section.

D. Wherein these criteria differ from requirements of Related Sections, the more stringent criteria shall prevail unless otherwise directed in writing by the Engineer.

1.6 AS-BUILTS

A. The Controls Contractor shall keep a full-sized set of floor plans and submittal documents on-site that shall be updated daily (failure to keep active red-lined documents on-site and up-to-date may result in a delay of pay requests until the documents have been brought current).

B. As-built floor plans are to be provided and shall include, as a minimum the following content:
   1. Field Panel, Global Network Controllers (GNC), and PIU box device locations along with the associated network addresses shall be shown on a floor plan.
   2. Communication device locations (repeaters, transducers, and converters).
   3. Annotate via symbols all devices located above ceiling or otherwise in concealed locations.
   4. Tier 1 and Tier 2 DDC system communication cable routing (delineate copper from fiber media):
      a. Provide actual routing and not homeruns.
      b. Provide a legend distinguishing cable type and colors of cables.
   5. The location of AHU duct static pressure sensor and hydraulic piping pressure sensors.
   6. Exhaust fan locations and the controls associated with each fan.
   7. Locate all drives.
   8. Location of BTU meter and related sensors.

C. At the completion of the project, provide as-built drawings in AutoCAD (.dwg AND PDF format) on CD-ROM/DVD disk media. A copy of the As-Built PDF documents shall be stored on the Workstation hard drive. A record drawing shall be produced by the project Engineer based on input red line field asbuilt provided by the control contractor.

D. Update the Sequence of Operations to reflect the installed sequences.

E. Field panel to I/O device terminations need not be shown on the as-built floor plan but shall be shown on the field panel record documents.

1.7 SYSTEM WARRANTY

A. All control devices provided by this Contractor shall be warranted to be free of defects in workmanship and material for a period of one year from the project Final Substantial Completion date.
B. Any equipment found to be defective during this period shall be repaired or replaced without expense to the Owner.
C. Warranty work shall be accomplished by the Contractor during normal working hours (8 AM to 5 PM, Monday through Friday, excluding holidays).
D. The Contractor shall respond to all warranty items within one working day from the date reported.
E. Provide a report to the Owner identifying the problems, the devices affected and the nature of the repair or replacement.
F. The warranty shall cover all costs for parts, labor, shipping, associated travel, any software sequence modifications, and expenses throughout the warranty period.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Following control manufacturers are approved on this project:

- Trane
- KMC
- Alteron

2.2 COMMUNICATIONS NETWORKING, PC WORKSTATIONS, AND INTEGRATION SUPPORT

A. General
   1. The Digital Network shall consist of a minimum of two tiers of communication.
      a. The lowest level tier shall be comprised entirely of cabling provided by the Controls Contractor which shall interconnect Controls Contractor provided digital network elements, independent of the Owner's intranet.
      b. The highest level tier shall be at the Ethernet level used for communications with other upper level devices, other Global Network Controllers on-site, or to PC Workstations (either local or remote sites) or Servers residing on the Owner's intranet.
   2. There shall be a single point of interface between the Controls Contractor provided network and the site intranet.

B. Global Network Controller (GNC)
   1. Provide an independent stand alone, microprocessor based control panel (Global Network Controller, GNC) for both
      a. Each facility shall have a minimum of one GNC as a part of the communication network.
      b. The operator shall communicate with the DDC system via the PC Workstation. The PC Workstation shall obtain data from the GNC via the Ethernet trunk.
   2. The GNC shall communicate to distributed Field Panels via the Controls Contractor provided cabling.
   3. In the event the Digital Network consists of multiple Global Network Controllers, all points available on one GNC shall be accessible to all other GNCs.
   4. Provide all hardware and software necessary to allow remote communications to off-site locations connected to the Owner's intranet. Remote PC Workstations on the Owner's intranet shall be able to communicate with the local site even if the local PC Workstation is turned off or not functioning. The Controls Contractor shall coordinate communications connectivity requirements with the Owner's Controls Department.

5. Each GNC panel shall have a clock with battery back-up. Where there are multiple GNC panels, the respective clocks shall be synchronized by the PC or a designated GNC. Provide a minimum of 30 minute UPS for the GNC to include any attached and/or expanded I/O loads. The GNC shall shutdown or go into a power loss mode prior to the loss of power from the UPS.
6. As many GNC panels as required shall be furnished to provide the monitoring and control functions and capabilities specified. The panel shall be strategically located in areas of the building that are easily accessible for maintenance and repair.
7. The trend log, schedules and alarms shall be located in the GNC or the Field Panels and not the PC. The PC may be used to archive old trend data and/or alarms.

C. Field Panels

1. The Manufacturer shall have multiple Field Panels (FPs) specifically designed for HVAC applications. Panels shall be programmable and not configurable. The devices shall be stand alone. The Field Panel devices shall be able to interface with an operator and interface/room and/or zone sensor devices (Microset, Net sensor). The operator interface device shall allow the operator to adjust set points, initiate push-button actions, and receive feedback of temperature and/or status.

    a. Input/Output (I/O) Interface
        (1) To gather sensor data and interface with controlled equipment, the FPs shall use I/O types consistent with the application for which it is designed. This design shall allow different types of points using any of the following input/output options:

            (a) Input Options (universal; analog or digital) - monitor the open/closed status of dry contacts, monitor analog values of voltages, current and resistance from temperature, pressure, relative humidity, CO_2 sensors, etc.
            (b) Digital Outputs Options - control on/off, start/stop, open/close relays.
            (c) Analog Output Options - supply voltage or current outputs to controllers.

    b. Universal Inputs (UI)
        (1) The Field Panel devices shall accept isolated dry contact closures (either normally open or normally closed contacts).
        (2) The Field Panel devices shall accept analog inputs (voltage, current, resistance). Minimum 12 bit A/D converters required.
        (3) Analog inputs can be linear or non-linear. Points shall include an A/D converter and an analog power supply. All points shall be wired to the FP device using #18 AWG twisted, shielded pair cables (Belden 8760 or equivalent) or larger or as recommended by the Control Manufacturer.

    c. Digital Outputs (DO) - The digital outputs shall control on/off, start/stop relays which have low voltage coils. Dry contact or triac outputs are acceptable. Common ground outputs are acceptable. Provide override switches and LED status lamps on relay assembly.
        (1) Enclosure Mounted—Use RIB model MUIS or equivalent.
        (2) Field Mounted—Use RIB model UIS or equivalent.

    d. Analog Outputs (AO) - The analog output supplies voltage or current to the control devices (i.e., damper actuator). All output points to valves and dampers shall read as a percent open. Signal types shall include 4-20 mA (into 1,000 Ohm load), resistance (up to 1,000 Ohms), and voltage (0-10 VDC). Provide a minimum 12-bit D/A converters.

2. Field panels shall include but not be limited to: AHU Control Panels, VAV boxes, VFDs, electric heat Controllers and EF Controllers.

2.3 PACKAGING AND ENVIRONMENT

A. Distributed Field Panel enclosures shall be locking type, metal cabinet, with common keying. The panels shall have a metal print pocket suitable for storing wiring, service and log information. Indoor panels shall be NEMA 1 hinged enclosures.
B. Each GNC panel shall be stand alone, mounted indoors, and in a standard NEMA 1 enclosure. The electrical power requirements shall be provided by the Controls Contractor. 110 VAC power should not be installed in the same raceway channels as 24 VAC. The 24 VAC power and the 110 VAC side of the panel shall be physically isolated and clearly labeled. Fuse all transformers. Control panels shall be clearly identified by labels (1" pop-riveted lettering). Provide and install as-built wiring diagrams to indicate the control points on all equipment. Provide laminated point lists in all GNC panels if provided with I/O.
C. The panel, when required, must functionally operate over a temperature range of 20 degrees F to 150 degrees F, and a humidity range of 0 - 95% non-condensing.
D. DDC panels shall come with a minimum of six pre-existing available knockouts for ease of wiring during installation.
E. The electrical requirements shall be identified and coordinated by the Controls Contractor. Any 110 VAC requirements are to be by the Contractor. 110 VAC power circuits to each panel shall be provided by the Contractor. 110 VAC power should not be installed in the same panel as 24 VAC. However, if 110 VAC power must be installed in the same panel with 24 VAC power due to design and/or system constraints, the 110 VAC side of the panel shall be physically isolated from the 24VAC side and clearly labeled. Fuse all transformers.
F. Control panels shall be clearly identified by permanent labels (one inch lettering), pop-rivet attached to the enclosure.

2.4 FIELD DEVICES

A. CURRENT SWITCHES
   1. Provide solid state current switches which when the current level sensed by the internal current transformer exceeds the pre-set trip point. Internal circuits are to be totally powered by induction from the line being monitored. Provide Form C relay contacts, while sensing both AC and DC circuits. Provide an LED that shall show three pieces of information (Rapid Flashing-switch is tripped, Slow Flashing-current is present but below the trip point, and No Flashing-current is either off or below the bottom of the range) and permits setting the trip point adjustment prior to system connection.
   2. Current switches shall be split core type and shall be non-adjustable.
B. ELECTRONIC TEMPERATURE SENSORS
   1. Temperature sensors shall be thermistor or 100 Ohm platinum RTD. Sensors shall be calibrated to less than or equal to a 1/4-degree F resolution for the specific application. Substitutions must be approved in writing by the PA/E. All sensors to be field verified as correct by the TAB Subcontractor prior to testing.
   2. Provide twisted pair lead wires and shield for input circuit or as otherwise required by the manufacturer.
   3. Use insertion elements in ducts not affected by temperature stratification or smaller than one square meter. Use averaging elements where larger or prone to stratification. Sensor length 2.5 m or 5 m as required.
   4. Insertion elements for liquids shall be brass separable sockets (i.e., thermowells) with minimum insertion length of 2-1/2 inches (60 mm).
   5. Provide outside air sensors with watertight inlet fittings, shielded from direct rays of the sun. Mount on the north side of the facility.

6. Wall mounted sensor shall be mounted at 5'–6" above finished floor in an area where free air current is not constricted or blocked. Final location shall be approved by the Owner and Engineer prior to installation.
7. Sensor elements shall be applicable for the medium being sensed (i.e., room elements, well mounted elements, duct mounted elements and outdoor mounted elements). Range shall be from 0 to 150 degrees F.
8. Provide Supply Air Temperature (SAT) sensors on all units with terminal heat, powered fans, or configurations that would result in a temperature difference between the zone's SAT and the AHU's SAT.

C. ELECTRONIC STATIC PRESSURE SENSORS

1. Static pressure sensors shall be differential pressure sensors, with the "high" output sensing the duct pressure and the "low" input sensing atmospheric pressure.
2. The range for the static pressure sensor shall be matched to the static pressure of the system being sensed, 0 to .5 inches, 0 to 2 inches, 0 to 5 inches, or 0 to 10 inches.
3. Accuracy shall be plus or minus 2% of the full range being sensed.
4. Duct Static Pressure sensors shall be provided with vinyl tubing from the sensing point to the associated AHU room. The pressure to current transducer shall be in the AHU room.

D. FILTER STATUS TRANSMITTER

1. Monitor existing.

E. HUMIDITY SENSOR/TRANSMITTER

1. Provide relative humidity sensor/transmitter where shown on the control drawings. Sensor and transmitter shall have:
   System Accuracy .....±2% RH @ 25°C from 20% to 95% RH.
   Output Signal Two-wire, 4-20 mA linear (or 0 – 10 VDC) proportional to 5% to 95% RH.
2. The transmitter power shall be compatible with and powered by the low voltage power supplied by this Contractor.

F. OUTSIDE AIR MONITOR AND CONTROL

1. Each VAV air handling unit shall have an airflow control station capable of performing constant volume control of outside air without loss of required outside air at part load.
2. Each airflow monitor and control station shall be completed with velocity pressure transmitter and air volume flow rate control.
   a. Pressure transmitter ranges shall be selected such that the velocities across the air monitor sensing element are at mid-range of the manufacturer's velocity range for the sensor.
   b. The Controls Contractor shall verify any outside air dampers not used to achieve the velocity requirements are disconnected and permanently secured shut.
   c. The Controls Contractor shall notify the Division 15 Contractor of any outside air openings that result in bypassing the air monitor sensor.
3. The major control instruments shall be capable of the following minimum performance:
   a. Differential Pressure Transducer: The differential pressure transducer shall be capable of transmitting a linear 4 to 20 ma (or 0 to 10 volts) output signal proportional to the differential (velocity) pressure input signals within the following performance and applications criteria.
      (1) Calibrated Spans not greater than 1-1/2 times the maximum design velocity pressure.
      (2) Calibrated Overall Accuracy .....±1.0% of span.

(3) Repeatability .....±0.05% of output.
(4) Operating Range of Sensor .....20°F to 150°F
(5) Operating Range of Transmitter ...20°Fto 150°F.
(6) The transmitter output shall be unaffected by direction (or attitude) of mounting or external vibrations, and shall be furnished with a factory calibrated span.

4. Units to comply with minimum manufacturer's up and downstream configuration, to be coordinated with Division 23 Contractor.
5. All velocity to CFM calculations shall be done in the DDC system.
6. Where called for on the AHU specifications, the AHU manufacturer shall provide the sensing station and matched velocity to signal conversion. Linearization and conversion from velocity to CFM shall be done in the DDC system.
7. When using a duct mounted air monitoring station, the sensing station shall be the responsibility of the Controls Contractor. The velocity signal shall be brought into the DDC system. Linearization and conversion to CFM shall be accomplished in the DDC system.

G. LOW TEMPERATURE LIMIT SENSORS

1. Provide low temperature protection thermostats of manual-reset type with sensing elements 8' or 20' in length. Provide thermostat designed to operate in response to coldest 1' length of sensing element, regardless of temperature at other parts of element. Support element properly to cover entire duct width. Provide separate thermostats for each 25 sq.ft. of coil face area or fraction thereof.
2. Sensors shall be provided by Controls Contractor, if not provided as an integral part of the AHU. Control circuit shall be 110 VAC and shall be provided by the Controls Contractor.
3. If called for on the documents, provide a BI to an auxiliary contact.

H. CONTROL WIRING

1. All conductors shall be of stranded copper wire.
2. All PVC/EMT/rigid steel conduit and outlet boxes shall conform to the requirements specified under Division 26, Electrical.
3. All cabling (routed in conduit or not) shall be plenum smoke rated.
4. All wiring cables shall have 600-volt insulation and shall be provided with a bound stripping string to facilitate preparing wire terminations.
5. Conduit fittings shall be steel compression or set screw type.

I. VARIABLE FREQUENCY DRIVE (VFD) MOTOR SPEED CONTROLLER (Refer to Drawings for Voltage, Size, and Location found on Air Handling Unit Equipment Schedules)

1. Provide the following minimum hard-wired discrete inputs/outputs between the drives and the DDC system:
   a. AO to control drive speed;
   b. AI reference to monitor actual drive speed;
   c. BO to activate the drive;
   d. BI for drive failure alarm (drive fault).
3. If specifically called for on the plans, provide a communications integration interface between the drive and DDC system. This requirement shall not replace the requirement for the listed minimum discrete I/O points.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Each control system shall be complete with all necessary thermostats, valves, relays, switches, accessories, etc., and all interconnections and so arranged that they shall provide the proper automatic sequence of operation between the various control devices, as required to maintain the desired temperature, conditions and sequence, to provide a complete operating system. The intent of this specification is for the Controls Contractor to provide all necessary components to achieve the desired operations whether or not interposing devices are specifically shown on the documents.

B. All control equipment shall be fully modulating unless otherwise noted, and relays or accessories not specifically mentioned but required for proper operation shall be included.

C. The system shall be installed by competent personnel, who are well trained and regularly employed by the Control Contractor. Installation by the Mechanical Contractor is not acceptable, unless otherwise noted on the plans.

D. Control and instrument wiring and capillaries are to be secured to the building structure using J hooks (not to ductwork, conduits, or water piping).

E. The exact location of instruments, panel boards, accessories, etc. may be located where the old system used to be.

F. All non-panel and panel mounted instruments shall be clearly labeled as to use and system served by means of engraved laminated name plates permanently attached to the device. Use pop rivets or other permanent fasteners to secure labels. Where no space exists on the device, provide a means to securely attach the name plate (or metal engraved tag) to the device.

G. Where control instruments or accessories are to be installed on covered casings, ductwork etc., they shall be mounted on a permanent surface of the equipment (not on removable covers). Care shall be taken that there are no leaks around the stems where they pass through the metal work. Provide insulation or device extensions to minimize condensate forming.

H. All existing modulating control valves, dampers, etc., shall operate in a slow, gradual manner without any jerking or slamming.

I. This Control Contractor shall furnish any necessary additional controls, relays, or damping devices, as required, to correct cycling or hunting that occurs in any part of the control system after the system is in operation.

J. Install new controller .

K. Field panel assemblies shall be provided per the following guidelines:
   1. Field Panels shall be installed in a neat and orderly manner. Standards of quality and acceptance shall be at the sole discretion of the Engineer.

L. All above ceiling devices shall have a permanently mounted label on the ceiling visible from below. Labels shall be permanent and pop-riveted to the ceiling grid or otherwise secured to hard ceilings.

M. Furnish and install as-built wiring diagrams to indicate the control points on all equipment. Also, provide laminated point lists in all control panels.

N. Provide transient voltage surge suppression on FPs, GNCs, and field devices, as required by the manufacturer.

O. Programming code shall be documented in line using REMARK statements. Any changes after acceptance shall be REMARKED, dated, and initialed by the person changing the code.

3.2 CONTROL WIRING

The following criteria shall be met. Should any deviation be required to comply with manufacturers requirements then the Engineer shall be notified of any deviations prior to installations.

A. Provide over-current protection for all control and interlock wiring.
B. Line voltage and external to enclosures low voltage control wiring shall be run in conduit in mechanical equipment rooms. Do not install low and high voltage in same conduit. J-hooks may be used above ceiling where no conduit is required.
C. No splices shall be allowed.
D. Utilize existing conduit, additional conduit fittings shall be steel compression type. Set screw fittings are not acceptable.
E. Wiring Conventions:
    1. Communication Wiring provided by the Controls Contractor shall be 18 gauge, 2 wire, shielded cable - GREEN in color (Belden #8760 or equivalent).
    2. Field Panel I/O Wiring provided by the Controls Contractor shall be per the following:
        a. Analog Inputs – WHITE.
        b. Analog Outputs – YELLOW.
        c. Binary Inputs – ORANGE.
        d. Binary Outputs – BROWN.
    3. Field Panel Power Wiring shall be BLUE with grounded secondaries, unless specifically prohibited by the Manufacturer.
F. Cables shall be properly identified/tagged with matching wire markers on both ends as to the control point. Wire marker ink shall be permanent and shall survive water and/or oil being wiped on the surface. Provide heat shrink labels on both ends of wiring.
G. Wiring installed in concealed locations (i.e., ceilings to wall temperature sensors, above hard ceilings, underground, etc.) shall be run in conduit. EMT conduit fittings shall be steel compression type. Set screw fittings are not acceptable. Conduit shall be no less than 3/4" diameter.
H. Non conduit wires (exposed wires above ceiling) shall be decided by the detail spec (project scope).
I. Any cable or wiring installed in a drywall partition must be run in a minimum of ½" conduit.

3.3 CONTROL MANUFACTURER'S FIELD SERVICES AND INSTRUCTIONAL REQUIREMENTS

A. Start-up and commissioning system: Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation. On-site training shall not begin until the system has been accepted by the Owner/Engineer and field verifications have been completed.

B. On-site Training: Provide forty (40) hours of training. This training shall be completed in group designed by the Owner at one time in one four-hour session. The training shall focus on the specific installation and shall address both hardware and software. Specific as-built documentation for this project shall be used for reference as a part of this training. Pre-submit course outline to the Owner as stated above.
C. It shall be the Owner's responsibility to provide adequate time for attendance at all training sessions.

3.4 DEMONSTRATION

A. General: Provide field testing and adjustment of the complete DDC and an on-site operational acceptance test of the complete operational DDC. Notify the Owner in advance of all testing activities. The Owner may witness all tests.

3.5 SUBSTANTIAL COMPLETION, ACCEPTANCE, AND WARRANTY

A. After the Engineer’s verification, an acceptance test of the completed system in the presence of the Owner's representative and the Engineer shall be performed. When the system performance is deemed satisfactory by these observers and all record (as-built) drawings have been received by the Owner, that part of the system shall be considered substantially complete.

B. All control hardware, software, and firmware installed by the Controls Manufacturer or the Manufacturer representative shall be warranted by the Controls Manufacturer for a period of one year. Defects arising during this warranty period shall be corrected without cost to the Owner.
C. During substantial completion and final walk-through the Control contractor shall be present.

3.6 TESTING

A. The Control Contractor shall test the entire system and document the point by point operation of all controls and perform all required continuity testing of conductors prior to final connection to control equipment.
B. Substantial Completion inspections shall not be scheduled or performed until a detailed statement has been received from the Control Contractor certifying that the point-to-point checks have been completed. Also, a list of any non-completed or improperly operating devices shall be a part of this certified statement. This list must be submitted a minimum of five days prior to a Substantial Completion inspection.
C. Provide an all points print report log with the substantial completion inspection report.

3.7 CALIBRATION AND ADJUSTMENT

A. After completion of the installation, perform calibration and adjustments of the Automatic Temperature Control system provided under this contract, and supply services incidental to the proper performance of the temperature control system under the warranty below. This includes existing components and newly installed components.
B. Provide a detailed calibration and checkout log detailing the calibration and adjustment activities performed.

3.8 PREVENTATIVE MAINTENANCE INSPECTIONS

A. Preventative Maintenance Inspections shall be included within the scope of the work specified herein and shall consist of the following:
    1. Coverage to start at Substantial Completion and extend for one year from that date.
        a. The first year shall be coordinated through the Owner's normal warranty process as defined under the General Conditions.

PART 4

SEQUENCE OF OPERATION

4.1 BASIC REQUIREMENTS

A. The control sequences indicated in the specifications herein show the intended sequence of operation of the various control systems and shall be followed completely, deviations are not acceptable.
B. The Control Contractor is responsible to provide/add the required points to correctly perform the specified sequence of operation.
C. Refer to the drawings for sequence of operation.

Part 5

OPERATOR INTERFACES, GRAPHICS AND TRENDING

5.1 SOFTWARE

A. Basic Interface Description

1. Operator workstation interface software shall minimize operator use and through the use of English language prompting. English language point identification and industry standard PC application software. The software shall provide, as a minimum, the following functionality:
   a. Real-time graphical viewing and control of environment
   b. Scheduling and override of building operations
   c. Collection and analysis of historical data and dynamic data (trend plot)
   d. Definition and construction of dynamic color graphic displays
   e. Editing, programming, storage and downloading of global network controller databases
   f. Alarm reporting, routing, messaging, and acknowledgment
2. Provide a graphical user interface which shall minimize the use of the keyboard by using a mouse or similar pointing device with a "point and click" approach to menu selection.
3. The software shall provide a multi-tasking type environment that allows the user to run several applications simultaneously. Other Windows applications shall run simultaneously with the DDC software. The mouse or Keyboard shall be used to quickly select and switch between multiple applications. The operator shall be able to work in Microsoft Word, Excel, and other Windows based software packages, with concurrent annunciation of on-line DDC alarms and monitoring information.
   a. Provide functionality such that any of the following may be performed simultaneously on-line, and in any combination, via user-sized windows:
      (1) Dynamic color graphics and graphic control
      (2) Alarm management, routing to designated locations, and customized messages
      (3) Week at a Glance Time-of-Day scheduling
      (4) Trend data definition and presentation
      (5) Graphic definition and construction
      (6) Program and point database editing on-line
   b. Report and alarm printing shall be accomplished via Windows program manager, allowing use of network printers.
4. Provide a security system that prevents unauthorized use. (Owner should define the number of passwords.)
   a. The user shall have an individual password, which should be individually assigned which control functions and menu items the user has access to. The password, user name, and access assignments shall be on-line, at the operator’s terminal. The user should also have a set security level that defines access to displays and also defines what individual points the user can control.
5. Operator Activity Tracking—An audit trail report to track system changes, accounting for operator initiated actions, changes made by a particular person or changes made to a specific piece of equipment designated time frame, shall be printable and archived for future use. The operator activity tracking shall be in a tamper-proof buffer file.
6. Reports shall be generated on demand or via pre-defined schedule and directed to either CRT displays, printers, or disk. As a minimum, the system shall allow the user to easily obtain the following types of reports:
   a. A general listing of all or selected points in the network
   b. List of all points currently in alarm
   c. List of all points currently in override status
   d. List of all disabled points
   e. List of all points currently locked out
   f. List of user accounts and access levels
   g. List all weekly schedules
   h. List of limits and dead-bands

i. Excel reports
j. System diagnostic reports including, list of DDC panels on line and communicating, status of all DDC terminal unit device points
k. List of programs

7. Scheduling and Override
   a. Provide a graphical spreadsheet-type format for simplification of time-of-day scheduling and overrides of building operations. Schedules reside in both the PC workstation and DDC Global Network Controller to ensure time equipment scheduling when PC is off-line, PC is not required to execute time scheduling. Provide override access through menu selection or function key. Provide the following spreadsheet graphic types as a minimum:
      (1) Display of Weekly schedules shall show all information in easy to read 7 day (week) format for each schedule. This includes all on/off times for each day along with all optimum start information.
      (2) Holiday schedules shall show all dates that are to be holidays. Holidays shall be shown on the terminal in a graphical calendar format showing all scheduled days for a given month. User shall be able to easily scroll through the months for each year. Each day assigned as a holiday shall display as "All Off" or show "Scheduled" for that day.
      (3) Event schedules shall be shown in the same graphical calendar format and manner as Holiday schedules. Event schedules allow for scheduling of special events. After an event has elapsed, control returns to normal schedule.
   b. Operator shall be able to change all information for a given Weekly, Holiday or Event schedule if logged on with the appropriate security access. This includes all information that has to do with optimum start including assignments such as sensors to use and heating/cooling factors.
8. Collection and Analysis of Historical Data
   a. Provide trending capabilities that allow the user to easily monitor and preserve records of system activity over an extended period of time. Any system point may be trended automatically at time-based intervals or change of value, both of which shall be user-definable. Trend data may be stored on hard disk for future diagnostics and reporting. Additionally, trend data may be archived to network drives or removable disk media for future retrieval.
   b. Trend data reports shall be provided to allow the user to view all trended point data. Reports may be customized to include individual point or predefined groups. Provide additional functionality to allow predefined groups to be easily transferred on-line to Microsoft Excel. DDC contractor shall provide custom designed spreadsheet reports for use by the owner to track energy usage and cost, equipment run times, equipment efficiency, and/or building environmental conditions. DDC contractor shall provide setup of custom reports including creation of data format templates for monthly or weekly reports.
   c. Provide additional functionality that allows the user to view real-time trend data on trend graph displays. A minimum of six (6) points may be graphed, regardless of whether they have been predefined for trending. The dynamic graphs shall continuously update point values. At any time the user may redefine sampling times or range scales for any point. In addition, the user may pause the graph and take “snapshots” of screens to be stored on the workstation disk for future recall and analysis. Exact point values may be viewed and the graphs may be printed.
   d. System software shall be capable of graphing the trend log point data. Software shall be capable of creating x-y graphs that display multiple points at the same time in different colors. Graphs shall show point value relative to time.

e. Operator shall be able to change trend log setup information as well. This includes information to be trend logged as well as interval at which information is to be logged. All points in the system may be logged. All operations shall be password protected. Setup and viewing may be accessed directly from any and all graphics point is displayed on.

9. Application Software
The application software is the auxiliary software which shall be included in the system as follows.
   a. Energy Management Software
      (1) Daily use
      (2) Monthly use
      (3) Daily Hi and Low
      (4) Monthly Hi and Low
      (5) Demand Limiting and Load Shedding Program
   b. Maintenance Software
      (1) Schedule Maintenance
      (2) Run time accumulation for any specified equipment
   c. Occupancy Software
      (1) After hour use log
10. Alarm Indication
   a. System Terminal shall provide audible, visual and printed means of alarm indication. The Alarm Dialog box shall always become the Top Dialog box regardless of the application(s) being run at the time (such as a word processor). Printout of alarms shall be sent to the assigned terminal and port.
   b. Provide log of alarm messages. Alarm log shall be archived to the hard disk of the system terminal. Each entry shall include point descriptor and address, time and date of alarm occurrence, point value at time of alarm, time and date of point return to normal condition, time and date of alarm acknowledge.
   c. Alarm messages shall be in plain English (or specified language) and shall be user definable on site or via remote communication. System shall provide a minimum of 20 user definable messages for each zone controlled.
   d. Existing life safety equipment/devices shall remain as is and shall remain uninterrupted.

11. Energy Log Information
   a. System shall periodically gather energy log data stored in the field equipment and archive the information on the operator terminal's hard disk. Archive files shall be appended with the new data, allowing data to be accumulated over several years. Systems that write over archived data shall not be allowed. System shall automatically open archive files as needed to display archived data when operator scrolls through the data. Display all Energy log information in standard engineering units.
   b. System software shall be capable of graphing the Energy log data. Software shall be capable of creating graphs in x-y format that show recorded data relative to time.
   c. Operator shall be able to change the Energy log setup information as well. This includes which meters to be logged, meter pulse value and what type of energy units are being logged. All meters monitored by the system may be logged. All operations shall be password protected.
   d. Provide means for operator to export to a comma delimited file format all trend log data for use by other spread sheet programs. Operation of system shall not be affected by this operation. In other words, it shall stay completely on-line.
12. Controller Status

a. Provide means for operator to view communication status of all controllers connected to the system. Display shall include controller, status and error count. Status shall show if controller is communicating or not. Error count shall show actual count of communication errors between system and controllers in the field.
b. Provide means for operator to reset error count for all controllers to zero.
c. Provide capability to select alarm indication for each controller.

13. Configuration/Setup
    a. Provide means for operator to display and change system configuration. This shall include but not be limited to system time, day of the week, date of Daylight Savings set forward/setback, printer type and port addresses, modem port and speed, etc. Items shall be modified utilizing easy to understand terminology using simple mouse/cursor key movements.
14. Dynamic Color Graphic Displays
    a. Create Site Layout Color graphic including building penetration Icons, building floor plan displays with room temperatures and other building sensors values dynamically displayed. Icon links on the floor plans shall allow penetration to the building's mechanical equipment. Provide System graphics for each piece of mechanical equipment, including air handling units, exhaust fans, VAV's, VFDs systems as applicable, with dispersed dynamic data as indicated in the system point I/O summary of this specification. Points required by the sequence of operations shall also be displayed even if they are not defined by the I/O schedule to optimize system performance analysis and speed alarm recognition. Submit graphics for approval prior to system checkout. Provide as a minimum the following graphics.
        (1) Site layout
        (2) Building Floor plans
        (3) Individual AHU graphics
        (4) ALL EQUIPMENT shall be shown on the floor plans, clicking on the device shall display all data associated with the device.
        (6) All graphics shall provide, in addition to the system points, the following.
            Outside air temperatures
            Building CHWS/CHWR temperatures

    b. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands. Graphics software shall permit the importing of Auto-cad or Bitmap drawings for use in the system.
    c. Dynamic temperature values, humidity values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention and without pre- defined screen refresh rates.
    d. Analog bars in 3 sizes, or color conventions shall be available for monitor and control of analog values; high and low alarm limit settings shall be displayed on the analog scale or available and displayed separately. The user shall be able to "click and drag" the pointer to change the set point.
    e. Provide the user the ability to display blocks of point data by defined point groups; alarm conditions shall be displayed by flashing point blocks.
    f. Equipment state can be changed by clicking on the point block or graphic symbol and selecting the new state (on /off) or set point.
    g. Colors shall be used to indicate status and change as the status of the equipment changes. The state colors shall be user definable. (Red-Alarm, Green-OK).

h. The windowing environment of the PC operator workstation shall allow the users to simultaneously view several applications at a time to analyze total building operation or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.

i. Off the shelf graphic software, Micro-gafx Designer or Coral Draw software shall be provided to allow the user to add, modify or delete system graphic displays.

j. A clipart library of HVAC and automation symbols shall be provided including fans, valves, motors, AHU systems, standard ductwork diagrams and laboratory symbols that pertain to each project specific. The user shall have the ability to add custom symbols to the clipart library.

END OF SECTION 230900

SECTION 232113 – CHILLED WATER PIPING – SCHEDULE 40 IRON

NOTE: All requirements of this section shall comply with sections 230000

PART 1 - GENERAL

1.1 Description of Work:

A. Extent of Chilled water piping systems work, is indicated on drawings and schedules, and by requirements of this section.
B. **I**nsulation for Chilled water piping is specified in applicable Division 230713 sections and is included as work of this section.

1.2 Quality Assurance:

A. Manufacturers regularly engaged in the manufacture of chilled/hot water piping systems products, or types of materials and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
B. Installer with at least three (3) years of successful installation experience on projects with chilled/hot water piping systems work like that required for project.
C. Mechanical Code Compliance:
Comply with applicable portions of Florida Mechanical Code 2017 6TH Edition pertaining to mechanical materials, construction, and installation of products.
D. ANSI Compliance**:**
Comply with applicable American National Standards pertaining to products and installation of chilled water piping systems.
E. Welding:
Qualify welding procedures, welders and operators in accordance with ANSI B31.1, Paragraph 127.5, for shop and project site welding of piping work.
F. Welders shall be tested and certified by an independent testing agency approved by the engineer. Certifications shall be specifically obtained for this project.

1.3 Submittals:

A. Product Data:
Submit manufacturer's data for chilled/hot water piping systems, materials and products.
B. Shop Drawings:
Submit 1/2" = 1' - 0" scaled layout drawings of chilled water pipe and fittings including, but not necessarily limited to pipe and tubs sizes, locations, elevations and slopes of horizontal runs, wall and floor penetrations and connections. Show interface and spatial relationship between piping and proximate equipment.
C. Welding:
Submit welding qualification procedures, and certifications of welders.

PART 2 - PRODUCTS

2.1 Chilled Water Piping Materials and Products:

A. 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 that match pipe materials used in chilled water piping systems.

2.2 Basic Identification:

A. Provide identification in accordance with ANSI Standard A13.1-1975 "Standard Scheme for the Identification of Piping" with the following listing:

CHILLED/HOT WATER PIPING:
CHILLED/HOT WATER VALVES:
PLASTIC VALVE TAGS

2.3 BASIC PIPE, TUBE AND FITTINGS:

A. **GENERAL:**
Provide pipe, tube and fittings complying with Division 230000 basic materials and methods section "Pipe, Tube and Fittings", in accordance with the following listing:

CHILLED/HOT WATER PIPING:

SIZE 2" AND SMALLER:	BLACK IRON
WALL THICKNESS:	SCHEDULE 40
FITTINGS:	FORGED STEEL, THREADED
SIZE 2 1/2" AND LARGER:	BLACK IRON
WALL THICKNESS:	SCHEDULE 40
FITTINGS:	WELDED JOINTS

2.4 PIPING MATERIALS:

A. **GENERAL:**
Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

B. **BLACK IRON PIPE:** ANSI/ASTM A53, OR A120

2.5 PIPE/TUBE FITTINGS:

A. **GENERAL:**
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.

2.6 FITTINGS FOR IRON PIPE:

A. **MALLEABLE IRON THREADED FITTINGS**
ANSI B16.3; PLAIN

B. **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.

C. **PIPE NIPPLES**
Fabricated from same pipe as used for connected pipe.

D. **WROUGHT-STEEL BUTTWELDING FITTINGS**
ANSI B16.9 rated to match connected pipe.

2.7 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

A. **WELDING MATERIALS:**
Except as otherwise indicated, provide welding materials as determined by installer to comply with installation requirements. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for Welding Materials.

PART 3 - EXECUTION

3.1 INSTALLATION OF CHILLED/HOT WATER DISTRIBUTION PIPING:

A. **DELIVERY, STORAGE, AND HANDLING:**
1. **PROVIDE** factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.
2. **STORE** pipe and tube inside and protect from weather when possible. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
3. **PROTECT** flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrappings.

3.2 GENERAL INSTALLATION:

A. **COMPLY** with ANSI B31 Code for Pressure Piping.

3.3 PIPING SYSTEM JOINTS:

A. **PROVIDE** joists of type indicated in each piping system.
B. **THREAD PIPE** In accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting Manufacturer, on male threads at each joint and tighten joint to leave not more than three (3) threads exposed.
C. **WELD PIPE JOINTS** In accordance with ANSI B31 and recognized industry practice and as follows:
1. **BEVEL** pipe ends 37.5-degree angle where possible, smooth rough cuts, clean to remove slag metal particles and dirt.
2. **INSTALL** welding rings for buttweld joints.
3. **USE** pipe clamps to secure piping during welding.
4. **BUILD UP** Welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures that will ensure elimination of unsound or un-fused metal, cracks, oxidation, blowholes and non-metallic inclusions.
5. **DO NOT** weld-out piping system imperfections by track welding procedures; re-fabricate to comply with requirements.
6. **INSTALL ECCENTRIC REDUCERS** where pipe is reduced in size in direction of flow, with tops of both pipes and reducer flush.
7. **INSTALL PIPING** level, with no pitch.
8. **CONNECT BRANCH-FEED PIPING** to mains at horizontal center line of mains, connect run-out piping to branches at horizontal center line of branches.
9. **LOCATE GROUPS OF PIPES** Parallel to each other, spaced to permit applying full insulation and servicing of valves.
10. **DO NOT** weld pipes containing fluid.

3.4 INSTALLATION OF IDENTIFICATION

A. **GENERAL:**

1. Install mechanical identification close to valves, adjacent to changes in direction, branches, and where pipes pass through walls or floors, and at frequent intervals along straight runs of pipe as recommended by ANSI A131.1.
2. Use plastic decals with service and direction of flow for all piping.

3.5 INSTALLATION OF VALVES:

A. **INSTALL** valves in accordance with Division 230000 basic materials and methods Section 230523 "Valves".

B. **INSTALL** valves where indicated, and where required by this specification. Locate valves to be accessible for both operation and service. Install valves with stems up in vertical position, or to side in horizontal position, but in no case, install valves with stems down below horizontal plane.

3.6 VENT & DRAIN VALVES:

INSTALL on each mechanical equipment to the extent required to overcome leakage. Drain chemicals, stop-leak compounds, mastics, or other temporary repair methods. *Install vent at each rise of the pipe*.

3.7 EQUIPMENT CONNECTIONS:

A. **GENERAL:**

Connect chilled/hot water piping system to mechanical equipment as indicated, and comply with equipment manufacturer's instructions. Install shut-off, drain, and vent valves as recommended by the equipment manufacturer.

3.8 CLEANING, FLUSHING, INSPECTING:

A. **GENERAL:**

Clean exterior surfaces of installed piping in preparation of insulation and, or painting. Flush out piping system with clean water before proceeding with test. Inspect each run of piping for completion of joints, supports, and accessory items.

3.9 PIPING TEST:

NOTE: TEST PRESSURE PIPING *In accordance with ANSI B31.*

A. **GENERAL:**

Provide temporary equipment for testing. Test the piping section prior to insulation. The minimum pressure test period shall be two (2) hours at a pressure of 150 psi. The test shall fail if leakage is observed or if pressure drop exceeds 5% of test procedure.

END OF SECTION 232113

SECTION 233113 – METAL DUCTWORK

PART 1 - GENERAL

1.1 Related Documents

A. The Bidding Requirements and Contractual Conditions set forth in Division One apply to this Section.
B. The requirements of Division 23, Supplemental Provisions - Mechanical, apply to this Section.

1.2 Work Included

A. This Section includes low pressure ductwork (2" WG) as well as medium pressure duct work.

1.3 Quality Assurance

A. Requirements of the Florida Mechanical Code 2017, 6th Edtion shall be complied with.
B. Appropriate ASTM A653, ANSI, UL and NFPA standards must be met.
C. Sheet metal ductwork shall be constructed and installed in accordance with the 3rd Edition of SMACNA 2005 Standards.
D. Manufacturers product data such as specifications, catalog cuts, etc., must be submitted to the Project Architect/Engineer for all products specified.
E. Shop drawings and other data to indicate method of installation must also be submitted except where already fully detailed on Drawings.

PART 2 - PRODUCTS

2.1 Materials

A. Ductwork
   1. Low Pressure Ductwork (Constant Air Volume) shall be constructed of 24-gauge galvanized sheet metal.
   2. Medium Pressure Ductwork (Variable Air Volume) shall be constructed of 22-gauge galvanized sheet metal.
   3. Exposed ductwork shall be constructed of 24-gauge, double wall sheet metal with 1” insulation.
   4. Rigid ductwork - Constructed of galvanized steel in accordance with SMACNA Standards. Insulation shall be installed on the exterior of ductwork.
   5. Flexible ductwork - Insulated 3" WG pressure rating with reinforced aluminum foil liner and fiberglass insulation with K =< 0.25 at 75°F.
   6. Medium Pressure Ductwork - constructed of galvanized steel designed and fabricated to meet the pressure requirements and friction loss necessary for the application. Insulated ducts shall have a maximum K = 0.27 at 75°F.
   7. Flexible Connections - glass fabric coated with a fire-retardant compound.
   8. Dampers - constructed of galvanized steel with locking quadrant.
   7. Grilles, registers and diffusers shall be scheduled on Drawings. All grilles, registers, and diffusers shall be aluminum construction.

C. Volume Dampers shall be provided with locking, indicating quadrant regulators. Shaft shall extend beyond thickness of insulation. Dampers shall be constructed in accordance with SMACNA standards. Rod lengths greater than 30” shall have locking regulator on each end. Volume dampers either manual or motorized shall be equal to Ruskin CD-50 or TAMCO 1000SW.

D. Access doors shall be provided for all automatic dampers, electric duct heaters, air flow measuring stations, any control devices, and fire dampers, and other locations where duct access is required. Doors shall be a minimum of 22-gauge Sheetmetal or at least 2 gauges heavier than duct. Where doors are provided for insulated duct, door shall be double panel with a minimum of 1" insulation inside panel. Door shall be provided with a minimum of two hinges and a latex foam gasket sealed airtight. Minimum size of door shall be 12" x 12" as practical and be large enough and located so that proper service access is provided to equipment to be maintained.

E. Duct Insulation shall be 2" flexible fiber, ANSI/ASTM C553 commercial grade R6.7 minimum. .002 foil scrim facing. Tape all seams and apply vapor seal mastic. Staples and tape alone are not acceptable. Secure duct wrap to bottom side of duct for widths greater than 18". Do not over compress insulation with washer. Insulate supply and return duct and the tops of supply air devices. Acceptable manufacturers: Knauff Fiberglass; Owens Corning Fiberglass.

PART 3 - EXECUTION

3.1 Installation

A. Ductwork shall be installed and supported in accordance with SMACNA Standards. Duct sizes are to be specified as finished air passages after insulation is in place.

B. Seams and joints shall be external. Interior surfaces shall be smooth. All debris shall be removed from ducts and duct interiors shall be thoroughly cleaned.

C. Turning vanes shall be provided in all 45 and 90 bends. Duct seams shall be locked at corners and in the sides. Such are to be air tight. Ducts shall be reinforced where operations shafts extend through ducts and shall have bushings through the liner or insulation. All equipment in ducts shall be bolted in position or mounted on a secure platform. Adequate clearance shall be provided for easy removal.

D. Ductwork shall be supported or suspended from building structure with adequate clearance to fixtures and allow ceiling system's removal.

E. Flexible connections shall be installed where ducts connect to HVAC equipment.

F. Dampers shall be placed at branch take-offs from main ducts and in divisions of main ducts. Dampers shall be fastened to a square operating rod.

G. Medium pressure ductwork shall be installed in accordance with manufacturer's instructions and with SMACNA. Rectangular ductwork shall be welded construction and in accordance with SMACNA Standards.

H. Medium pressure ductwork shall be tested by the Contractor and shall be later verified and tabulated by the Test and Balance Agency. Test pressure shall be 50% greater than the designed operations pressure. Total leakage of the system shall not exceed 1/4 of 1% of the capacity of the system.

END OF SECTION 233113

SECTION 237313 - CENTRAL STATION AIR HANDLING UNIT

PART 1 - GENERAL

1.1 Work Included:

A. All requirements of this Section shall comply with Sections 230000 and the requirements of the project manual.
B. Provide air-handling unit of the size, type and configuration as scheduled and shown on the drawings. Contractor to coordinate with the mechanical room location and layouts.
   1. Manufacturer of the AHU shall ship the disassembled equipment to the project site. The manufacturer's representative shall inspect all sections for proper delivery, and shall forward a report to the engineer, stating such an inspection and verification.
   2. Mechanical contractor shall re-assemble the fan, coil, filter and mixing box sections of the air handling unit inside the mechanical room on the modified concrete housekeeping pad.
   3. Refer to detail drawings for construction of all house pads for equipment supports.
   4. Manufacturer shall inspect the assembled unit. Assembly of the sections shall be leak and vibration free.
   5. Mechanical contractor shall make the final connection on O/A duct and return air duct to the opening of the mixing box. Also connect the supply air duct.
   6. Manufacturer/ Contractor shall issue a letter to the Engineer stating the completion of the assembly.

1.2 Quality Assurance:

A. Certify unit components in accordance with ARI Standard 430 as applicable.
B. Certify coils in accordance with ARI Standard 410. Substantiate performance by ARI computer generated output.
C. ASHRAE Compliance: Construct and install refrigerant coils in accordance with ASHRAE 15 "Safety Code for Mechanical Refrigeration".
D. Complying with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
E. 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.
F. NEC Compliance: Comply with National Electrical Code (NFPA 70) as applicable to installation and electrical connections of ancillary electrical components of air handling units.

G. Fan shall be tested in accordance with ANSI/AMCA Standard 210 and rated in accordance with ANSI/ASHRAE Standard 51.

1.3 Submittals:

A. Product Data: Submit manufacturer's technical product data for rooftop unit showing dimensions, weights, capacities, ratings, fan performance with operating point clearly indicated, motor electrical characteristics, gauges and finishes of materials, and installation instructions.
B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, weight loadings, required clearances, construction details, and field connection details.
C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to rooftop unit. 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.

D. Maintenance Data: Submit maintenance instructions, including instructions for lubrication, filter replacement, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in maintenance manuals in accordance with requirements of Divisions 1.

1.4 Product Delivery, Storage, & Handling

A. Deliver rooftop unit with factory-installed shipping skids and lifting lugs; pack components in factory-fabricated protective containers.
B. Handle rooftop unit carefully to avoid damage to components, enclosures and finish. Do not install damaged components; replace and return damaged components to rooftop unit manufacturer.
C. Store rooftop unit in clean dry place and protect from weather and construction traffic.
D. Comply with Manufacturer's rigging and installation instructions for unloading rooftop unit and moving equipment to final location.

PART 2 - PRODUCTS

2.1 General:

A. Each AHU shall be provided with fan & motor, coil, filter, and mixing box sections with thermal breaks between each. manufacturer shall deliver each unit in the following sections.
   1. Fan Section
   2. Coil & Filter Section
   3. Mixing Box Section

2.2 Casing:

A. Provide units of sectionalized cabinet construction. Fabricate sheet metal parts of continuous heavy gauge galvanized or phosphatized painted steel. Provide reinforcing and bracing required for maximum rigidity.
B. The entire casing (fan, filter, coil, mixing box) shall be factory assembled double wall with 1-1/2", 3 lb. density insulation (R-13). AHU shall be equipped with access door on the accessible sides (refer to the floor plans.)

2.3 Blower Section:

A. Provide direct drive plenum fan constructed of galvanized steel.
B. Provide fan curve and operating point as scheduled, or as required by performance specifications. Fan shall be statically and dynamically balanced.
C. Provide units with internally mounted fan motors. Locate motors on factory slide rail base complete with adjustment nuts. The TEFC Fan motor shall be mounted on vibration isolator with not less than 92% def. efficiency.

NOTE: Shipping blocks shall be removed prior to unit start up.

D. Provide fan bearings of the ball, roller, or pillow block type, self-aligning and grease lubricated. Provide extended lubrication lines from fan bearing to unit casing. Select bearings for an average life of 200,000 hours at design operating conditions.

2.4 Coil Section:

A. Fabricate casings and supports of stainless steel construction.
B. Provide double wall stainless steel constructed drain pan consisting of 1" urethane insulation in between. Drain pan shall extend under coil and shall be pitched 1/4"/ft. toward the drain point.

C. Coil, more than one set (stacked on top of each other), shall have an intermediate drain pan constructed of stainless steel, extended at least 22" and pitched away from the coil, piped down to main drain pan below.
D. Completely enclose coil headers within the insulated casing with connections extended through cabinet.
E. Insulate coil sections identically to fan section.

2.5 Cooling Coils

A. Provide coil constructed of copper tubes, aluminum fins with Schedule 40 steel headers.
B. Provide 1/2" or 5/8" outside diameter tubing with aluminum fins. Bond fins by mechanical expansion.
C. Provide coil with a maximum working pressure of 175 PSIG at 200 F.
D. Provide circuited drainable coil with vent connection at highest point and drain connection at lowest point.
E. Coil shall be selected based on the flow velocity equal to or greater than the scheduled value.

2.6 Filter Section:

A. Furnish factory-built flat filters. Filter section to house MERV 8 (2”, 35%) and MERV 13 (4”, 90%) efficiency pleated filters. The Filter rated face velocity not to exceed the specific value on the schedule; performance shall be based on ASHRAE Standard 52 - 76 test method.
B. Filters shall be provided by the Manufacturer along with a spare set of each type for each AHU.

2.7 Mixing Box:

A. Double wall mixing boxes shall be provided by the manufacturer.

2.8 Manufacturers:

A. Basis of Design: Carrier
B. Other Approved Manufacturers:
   1. York
   2. Trane
   3. McQuay

Note: Manufacturers shall provide complete submittals for review and approval. Submittal shall bear the Contractor’s stamp of review.

PART 3 - EXECUTION

3.1 Installation:

A. Install unit on a level 6" high house pad constructed by the general contractor. Exceed the unit footprint by 4” on each side and shall be painted with reflected yellow paint.
B. Provide clearance at the side indicated of unit for routine service including the changing of filters, removal of coils, bearing greasing, opening of access doors, pulling of blower shaft and removal of motors.
C. Ductwork: Duct connectors to unit to allow for straight and smooth airflow. The supply discharge opening shall be factory cut. Supply ductwork connections shall be gasketed to unit cabinet.
D. Piping:
    1. Support piping independently of coils and with adequate flexibility to prevent undue stress at coil header connections.
    2. Install full-size drain lines from the drain pan connection and include trap to permit condensate to drain freely. Condensate trap shall be primed prior to unit start up.
    3. Install service valves on both supply and return pipes to coils.

Note:
Pipes, valves, condensate drain or any other specified or required device external to the AHU cabinet shall not block access to the side door or prevent proper maintenance.

3.2 Start-Up, Testing, & Training:

A. Start-up unit, check for proper performance, motor rotation, air leakage, or infiltration, etc.
B. Prepare unit for test and balance as required under Section 230000.
C. Correct deficiencies found by Test and Balance Contractor.
D. Coordinate with Control Contractor for all control related requirements.

END OF SECTION 237313

SECTION 260500 – ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

A. Work included: Provide complete electrical and systems services where shown on the Drawings, as specified herein, and as needed for a complete and proper installation to include, but not necessarily limited to:

1. Devices;
2. Branch circuit wiring, in conduit, for junction boxes, lighting, A/C equipment, pumps, etc.;
3. Hangers, anchors, sleeves, chases, supports for fixtures, other electrical equipment, and materials in association therewith;
4. Other items and services required to complete the systems;
5. Raceways;
6. Grounding;
7. Lighting fixtures, supports and miscellaneous materials;
8. New circuit breakers in existing panelboards for new equipment as required;

B. RELATED WORK

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
2. Section 26 23 00 – Electrical Gear
3. Section 26 51 00 – Lighting

C. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
2. All division 26 sections listed above.

1.2 CODES

A. All work shall comply with the requirements of:

1. The Florida Building Code, Sixth Edition, 2017.
2. The 2014 National Electrical Code.
3. Chapter 489 of The Florida Statutes.
4. Occupational Safety and Health Agency Standards.
5. The local authority having jurisdiction.
6. Florida Fire Prevention Code – 2017
7. USF Design and Construction Guidelines

1.3 DEFINITIONS

A. Provide: The term "provide" used in this division shall include labor, materials, equipment, and special provisions necessary to install and test complete the item or system indicated. Items

called for, implied, or required to make the system operate properly shall be installed under the contractor's basic scope of work.

1.4 QUALITY ASSURANCE

A. The electrical contractor shall use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of division 26. Contractor shall have on site daily foreman capable of supervising required manpower. This person shall have supervised crews of electrical personnel on at least (5) previous projects of similar size and scope. Contractor shall prior to start of project provide the engineer with supervisory work history of proposed foreman for approval.

B. Without additional cost to the Owner, provide such other labor and materials as are required to complete the work of division 26 in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

C. Prior to bid, each bidder shall perform a through inspection of the site(s) to become familiar with the difficulties required to execute the work shown on the drawings and specified herein. The submission of the Bid proposal shall be construed as evidence that such a visit and investigation has been made. Claims for additional labor, equipment, or materials required for difficulties encountered shall not be considered. No additional monetary or time consideration will be given because of additional work required to accomplish required work because of existing conditions.

D. Contractor upon review of the site conditions and the bid documents shall inform the engineer (10 days prior to bid) of any discrepancies or deficiencies.

E. During inspections, the contractor shall have foreman available for all inspections to answer questions and to open or expose any electrical equipment or installation at Engineers request.

F. License and Qualifications:

1. The contracting Firm for the electrical installation shall be a registered business in the State of Florida and licensed by the local authorities.
2. The contracting Firm shall state Registered Electrical Contractor possessing an “ER” or “EC” license for this project. Contracting Firm shall submit a copy of license with number for verification purposes. Confirmations shall be on a Standard AIA Form A305 "Contractor Qualification Statement".
3. The firm shall be regularly engaged in the installation of electrical systems and other related equipment.
4. The contracting Firm shall be familiar with all local conditions including interpretations, codes and shall have at least five years of successful installation experience on similar projects of the same magnitude and scope.
5. The contracting Firm shall list at least three projects it has successfully completed over the last five years for proof of experience of this caliber. This list shall be included with qualifications prior to bid for review by Engineer. List shall include point of contact and phone number for verification. Submit qualifications, licenses, and AIA forms upon request.

G. Refer to other sections of division 26 for subcontractor (installer) requirements specific to the individual sections.

H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in National Fire Protection Association (NFPA) 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

I. Comply with most recently adopted NFPA 70.

1.5 SUBMITTAL

A. Comply with pertinent provisions of The General Specifications. This section governs all sections of Division 26 specifications.

B. Product data: Submittal data shall include as a minimum, the following:

1. Materials list of items proposed to be provided;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Manufacturer's recommended installation procedures which, when approved by the Engineer, will aid in establishing the basis for accepting or rejecting installation procedures.
4. Provide submittal data for the following:
   a. Devices
   b. Conduit, Fittings, Hangers, and Supports
   c. Wire
   d. Surface Raceway
   e. Wire and Cable
   f. Accessories
   g. Grounding (including connections)
   h. Equipment, materials, and shop drawings called for in other sections of Division 26.
   i. Shop drawings called for on the plans.
   j. Materials listed herein.

C. Samples:

1. Promptly provide samples as requested by the engineer. When specifically, so requested by the Contractor and approved by the Engineer, approved samples will be returned to the Contractor for installation.

D. One manufacturer shall be selected new for any specific classification of material, equipment or system. For example, all switchgear, panelboards, transformers, etc., shall be by one manufacturer. If more than one manufacturer is submitted, the engineer may select one and reject the others.

E. Exceptions to the Specifications: The Electrical Contractor shall submit exceptions taken to the specifications that where submitted to the General Contractor qualifying his/her bid. Failure to submit the Electrical Contractors Exceptions to the Specifications binds the Electrical Contractor to all conditions, terms, and responsibilities defined on the plans and specifications herein. Exceptions to the Specifications shall reference the exact section and paragraph of the specifications for which the Electrical Contractor is taking exception to, and shall list the cost difference between the Exception and that which was specified. Taking exceptions to the specifications does not release the contractor from the responsibility of conforming to the specifications and plans.

F. The review of systems, equipment, and shop drawings is a general review subject to the contract drawings, specifications, and verification of all measurements to be made in the field. Review does not relieve the contractor from the responsibility of shop drawing errors. The contractor shall carefully check and correct shop drawings prior to submission. Each shop drawing submittal shall bear the stamp and signature of the contractor, indicating he has checked and corrected errors on the shop drawings.

G. Product data shop drawings shall be reviewed and stamped by contractor, with all items identified and all technical data included.

H. Highlight proposed equipment with all options included.

I. Provide complete catalog numbers of proposed equipment.

J. Each set of shop drawings shall be submitted complete and as a single package.

1.6 PRODUCT HANDLING AND STORAGE

A. Comply with pertinent provisions of The General Specifications.

B. Receive and accept at the site, properly handle, house and protect from damage and weather until ready for installation all materials, equipment, and apparatus furnished under Division 26 of the specifications. Refer to each section of division 26 for additional requirements.

C. Equipment damaged in the course of handling, installation or testing shall be replaced or repaired to the satisfaction of the Engineer without any additional charge.

D. Store electrical items in interior spaces only, covered by canvass or plastic sheets of adequate thickness.

E. Store plastic conduit to avoid warping and deterioration. Protected from direct rays of sun.

F. Do not store any electrical conduit in contact with ground or floor. Do not store conduit in an area that retains water or water run-off.

G. All equipment not rated for wet or damp locations shall be protected from the elements after installation. Equipment that is exposed to water or the elements shall be replaced.

H. Store all materials in a secure location. Materials shall not be accessible to the general public. Provide a temporary fence around materials stored outdoors.

1.7 WARRANTY

A. Unless otherwise noted in other sections of division 26, the Contractor shall and does hereby warrant all materials and equipment furnished under his scope of work to be free from defects and to function or operate satisfactorily for a period of one year after final acceptance of the project.

B. Items not meeting this requirement shall be replaced or repaired without cost to the Owner, provided such defects or failures are not due to abuse, neglect or lack of reasonable and ordinary maintenance.

C. In the event, conflicts arise between the owner and contractor concerning the cause of equipment or material failure, the engineer shall make final decisions in determining the cause of the equipment failure.

1.8 FACTORY SERVICE

A. Factory service shall be provided on electrical equipment, specialized systems, and controls beyond the electrical contractors expertise.

B. Factory service shall be performed by factory trained and certified personnel.

C. Factory personnel shall be required to be on site within 24 hours of notification.

D. Items with a warranty period greater than one year shall be replaced at the manufacturer's expense once the electrical contractor's first year warranty period has expired.

1.9 SAFETY

A. Maximum consideration shall be given to job safety and only such methods that will reasonably insure the safety of all persons shall be employed. The codes and regulations of OSHA shall be followed in strict compliance as well as such other codes, laws, and regulations as may be applicable.

B. The contractor shall insure that all persons under his employment for this contract will be supplied with any protective equipment required. In addition it is the responsibility of this contractor to insure protective equipment is used during construction.

C. The Electrical Contractor shall have protective gear available for visitors (related to his/her scope of work) to the job site. The protective gear shall be new, unopened, and in the manufacturer's packing.

1.10 RECORD DRAWINGS

A. Provide and maintain at the site a set of construction prints which accurately reflect the installation of all work under this section. The construction prints shall indicate any variation from contract drawings including additions, deletions, changes in sizes, locations and dimensions. Corrections shall be clearly and completely indicated as work progresses. Prints shall be updated daily.

B. Construction prints shall be available for inspection by the Engineer and shall be used to help determine the progress of electrical work.

C. A copy of the original plans in AutoCAD release 2017 shall be supplied to the Contractor upon request.

D. At the completion of the project: The contractor shall prepare record drawings of the project. Transcribe the information on the construction prints to; (1) set optical or flash media prepared in AutoCAD release 2017 or higher, prepare (1) set red lines The revised drawings shall also include:

1. Corrected panel board and equipment schedules. Dimensioned locations of all stub-outs.
2. Correct circuit numbers as they appear on panel directories.

3. Exact locations of all underground raceways.
4. Routing of all service and feeder conduits.
5. Actual locations of devices, panels, disconnects, and fixtures.

E. Submit record drawings, media to engineer prior to request for final payment. Final payment will not be approved until such items have been received and approved.

1.11 ELECTRICAL TEMPORARY FACILITIES

A. Provide 3-wire grounded power system for construction power.

B. Provide lighting for all work areas to levels required by OSHA.

C. Provide double duplex receptacles and 220V outlets in all work areas to allow maximum 50 foot extension cord to reach any location in building. Extension cords and supplementary lighting for finishing shall be provided by each trade.

D. Fixtures, illuminated for construction, shall be cleaned after all trades have completed final inspection punch lists. The cost of this cleaning during construction shall be paid by the contractor.

1.12 SYMBOLS

A. The contractor shall be responsible for request for clarification of unclear, unreferenced, or unscheduled symbols prior to bid.

1.13 BASIS FOR WIRING DESIGN

A. The drawings and specifications describe specific sizes of switches, breakers, fuses, conduits, conductors, motors starters, and other electrical equipment. These sizes are based on specific items of power-consuming equipment, i.e., heaters, lights, motors for fans, compressors, pumps, etc.. Wherever the contractor provides power-consuming equipment that differs from drawings and specifications, electrical equipment for such installation shall be changed to proper sizes to match at no additional expense to the owner.

1.14 MAINTENANCE MANUALS

A. Manual: Upon completion of the work, and as a condition of its acceptance, deliver to the owner (2) copies of operation and maintenance manuals compiled in accordance with the provisions of The General Specifications. Include within each manual:

1. Copy of the approved Record Documents for this portion of the work:
2. Copy of all circuit directories;
3. Copies of all warranties and guarantees.
4. Copies of all operating and maintenance manuals for equipment supplied.
5. List all lamps required by fixture type.

1.15 CHANGES IN WORK

A. The cost of all changes in the work shall be substantiated by complete itemized statements showing quantities and unit prices for material, labor, applicable fringe benefits, equipment and other items of cost. Costs shall be actual costs to the contractor. The contractor shall submit receipts or any other evidences, as the engineer may direct, showing his actual costs and his rights to the payment claimed.

B. The labor units shall be based on market standards utilizing MEANS or NECA.

C. The labor unit pricing shall be based on the actual hourly wages with labor units allocation for journeyman, foreman and project manager.

1.16 ENGINEERS COMPENSATION

A. This Engineering Firm is a third-party beneficiary of the Construction Contract, and is hereby entitled to all the legal rights and means to seek compensation for issues that may be outside the scope of that Contract.

B. Engineering services shall be charged at $135.00 per hour plus expenses.

C. The Engineer's Contract with the owner provides for a one time review of shop drawings and submittal data. All actions; including incomplete submissions, delinquent or late submissions and substitutions, which require additional review of submittal, are considered additional services by the Engineer.

D. Any proposed electrical changes to the construction documents or proposed alternative materials submitted by the contractor after the award of the contract shall be reviewed only by agreement of the contractor to pay for engineering costs.

E. Resolving warranty conflicts between the Owner and Contractor are additional services and shall be billed to the Contractor.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide only materials that are new, and of the type and quality specified. Where Underwriters' Laboratories, Inc. has established standards for such materials, provide only materials bearing the UL label.

B. Materials shall be in strict accordance with the quality, style and size as specified herein, in the opinion of the specifying engineer. Manufacturer's names, series, and/or model numbers are given in the specifications and/or plans to denote a standard of quality, style, size, type, and operating characteristics. Only those manufacturers listed in each section are considered acceptable alternates. However, the only approved equipment for bid is the equipment listed and/or specified in the specifications and on the electrical plans accompanying these specifications.

2.2 GROUNDING SYSTEM

A. Ground rods: copper clad steel 3/4" diameter in 10' sections. Provide additional lengths in 10 feet sections to achieve specified minimum resistance to ground, measured in Ohms, at building services grounding systems.

B. Ground conductors: insulated, 98% copper, stranded.

C. Connections:

1. Acceptable Manufacturers:
   a. T&B
   b. Bundy
2. Building steel: compression, bolt type
3. Conduit: Bushing type
4. Pipe: Ground clamps with jumpers on expansion joints.
5. Driven ground: Exothermic (Cad) weld
6. Underground clamps shall be listed for application.
   a. Pipe Connectors: U clamp type, sized for pipe and conductor. Clamp shall be copper or brass and UL listed for direct burial.
   b. Ground connection for light pole (other than sports light pole) ground to driven ground rod: Acorn type, copper or brass, sized for the conductor and ground rod, and UL listed for direct burial.

D. Ground Bus Bars

1. Main electrical room ground bus bars: Newton Instrument Company insulated ground bar, copper, manufacturer pre-drilled holes. Minimum size shall be 1/4 inch X 4 inches X 20 inches. Bond to building grounding system with minimum 1/0 copper ground, or sized per code, for a continuous copper grounding system.
2. Electrical room ground bus bars (non-main electrical room): Newton Instrument Company insulated ground bar, minimum size 1/4 inch X 4 inches X 10 inches, copper, manufacturer pre-drilled holes. All ground bus bars shall be bonded to main electrical ground bus bar with minimum 1/0 copper ground, or sized per code, for a continuous copper grounding system. Utilizing building steel or footing is not acceptable.
3. Telecommunications, IDF, Data, computer, and similar rooms: Newton Instrument Company insulated ground bar, 1/4 inch X 4 inches X 20 inches, copper, manufacturer pre- drilled holes. Bond ground bus bar to main electrical ground bus bar or nearest electrical room ground bus bar with minimum 6 AWG copper.

2.3 WIRING DEVICES

A. Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA Standards Publication No. WD 1. Where types and grades are not indicated, provide proper selection as determined by Engineer to fulfill wiring requirements, and complying with NEC and NEMA standards for wiring devices. Unless otherwise noted, provide gray color devices for switches and receptacles. For receptacles serving data provide blue color devices.

B. Device grade shall be as follows:

1. Industrial Specification grade.

C. Manufacturers

1. Unless otherwise noted on the plans provide wiring devices produced by one of the following Manufacturers:
   a. Pass & Seymour
   b. Leviton
   c. Hubbell
   d. Cooper

D. Switches:

1. Switches shall be extra heavy duty industrial specification grade and rated for 120/277 volts, 20 amps. Snap switches shall be of the silent type and in compliance with U.L. 20, NEMA WD-1, and tested for compliance with Federal Specification W-S-896E. Coordinate switch color with A/E. Provide Pass & Seymour switches or approved equal as follows:

	Single Pole:	Two Pole:	Three Way:	Four Way:
Pass & Seymour	PS20AC1	PS20AC2	PS20AC3	PS20AC4

2. Key locking light switches shall utilize a tumbler lock type key. Key shall be removable in the ON or OFF positions. Install stainless steel cover plates. Provide two keys for each switch. Install switch in extra deep back box as required to accommodate depth of switch.

Key Operated	Single Pole:	Two Pole:	Three Way:	Four Way:
Pass & Seymour	PS20AC1KL	PS20AC2KL	PS20AC3KL	PS20AC4KL

E. Receptacles:

1. Receptacles shall be extra heavy duty industrial specification grade and in strict compliance with NEMA Standards WD-1 and WD-6, UL 498, and Federal Specification: WC 596F. Ground fault interrupters shall be provided with safelock protection.
2. General Duty duplex: 120 volt, 20 amp, color, industrial specification grade, NEMA 5-20 R duplex; Pass & Seymour #5362 or approved equal.
3. General Duty simplex: 120 volt, 20 amp, color, industrial specification grade, NEMA 5-20 R simplex; Pass & Seymour #5361 or approved equal.
4. Weatherproof: 120 VAC, 20 Amp Ground Fault Circuit Interrupter, weather resistant “WR”, and tamper resistant type receptacle with Zinc die cast housing and cover; Pass & Seymour #2095-TRWRGRY or approved equal, with Cast A1, WP box and Pass & Seymour #4511 cover.
5. GFI: 120 VAC, 20 Amp, GFI receptacles; Pass & Seymour #2095 or approved equal.
6. Computer: 120 volt, 20 amp, blue color, NEMA 5-20R duplex or double duplex receptacles; Pass & Seymour #5362-ABL or approved equal with engraved cover plate – “COMPUTER”.
7. Special purpose receptacles such as 30 Amp or higher, 208 volt or higher, or 3 phase receptacles shall match application. Selection of these receptacles shall be coordinated with circuit requirements and the equipment to be installed.
8. Generator: 120-volt, 20-amp, red color, NEMA 5-20R duplex or double duplex receptacle, Pass & Seymour #5362-ARED or approved equal with engraved cover plate in red color to read “GENERATOR”.

9. In wet locations GFI receptacles shall be provided with in use covers. Covers shall be die cast with pad locking capabilities, NEMA 3R construction and mounted horizontally and be in compliance with NEC 406.8, Hubbell #WP-26MH. For existing replacement locations, verify vertical or horizontal mounting methods.

F. Accessories:

1. Cover plates: Provide wall cover plates for wiring devices, of types, sizes, and with ganging and cutouts as required and shall match corresponding wiring devices.
   a. Cover plates shall be of one piece construction, sectional plates are not acceptable.
   b. Use metal screws to secure plates to devices; screw heads colored to match finish of plates. Cover plates shall be color.
   c. All wiring devices cover plates for receptacles shall be labeled or engraved with associated circuit number(s) in black stencil lettering and number(s).
   d. Exterior cover and plate in damp location: Weather resistant with self-closing door, cast aluminum, Perfect-Line: WGFL100-CVWH series.
   e. Special purpose and kitchen or food processing area receptacles shall have stainless steel cover plate to match application.

G. Classified Areas:

1. Devices and equipment installed in classified areas shall be UL listed for use in hazardous areas. Devices shall meet all the requirements of the division, class, and group of the classified area(s).

2.4 CONDUIT

A. Acceptable Manufacturers

1. National Republic
2. Triangle
3. Spang
4. Walker
5. Wheatland
6. Pittsburgh Standard
7. Allied
8. Youngstown

B. Galvanized Rigid Steel (GRS): Shall meet weight and welding requirements of the ASA standards and shall conform to all provisions of UL 6, ANSI C80.1, and WWC 581E. Conduit shall be galvanized by hot dipped or sherardizing process after cutting.

C. Electrical Metallic Tubing (EMT): shall meet the dimensions weight and welding requirements of the ASA standards and shall conform to all provisions of UL 797, ANSI C80.3, and WWC-563A. E.M.T. materials shall be electro-galvanized.

D. Poly Vinyl Chloride (PVC) Conduit: shall be Schedule 40 or 80, Gray, UV stabilized and conform to all provisions of UL 651, NEMA TC-2, and WC-1094A. PVC conduit shall be UL Listed for use in direct burial and concrete.

E. Flexible liquid - tight conduit: shall consist of a moisture and oil proof jacket extruded over a galvanized steel flexible conduit and shall conform to all provisions of UL 360. Acceptable Manufacturers:

1. Alflex

F. Flexible nonliquid-tight conduit shall be galvanized steel flexible conduit and shall conform to all provisions of UL 350 and WWC-C-566C. Acceptable manufacturers:

1. Greenfield.
2. Alflex

G. Aluminum Flexible: May be used as light fixture whips only. Aluminum Flexible is not acceptable in any other application.

H. Joints, Connectors, Couplings:

1. Acceptable Manufacturers
   a. Steel City
   b. Raco
   c. Efcor
   d. Thomas & Betts
   e. Appelton
   f. Bridgeport

I. GRS: Joints couplings and connectors shall be galvanized after cutting, standard thread. Threadless, indenture, and set screw type fittings will not be allowed.

1. Couplings - E.M.T.: Shall be steel compression type. Exterior shall be rain-tight. Pressure indented type connectors or cast metal are not acceptable. Connectors - E.M.T.: Shall be steel compression type with plastic insulated throat. Exterior shall be rain-tight
2. Conduit Termination Bushings: Provide Plastic bushings on all conduit terminations.
3. Bushings:
   a. One inch and Larger: Shall be metal body threaded with lock in insulating ring
   b. Smaller than one inch: may be steel or plastic.
4. Grounding bushings: Shall be O.Z. Type "LG", Efcor type 56 or equal.
5. Water tight flex connectors: Shall be liquid-tight, with insulated throat.
6. Exterior box connectors shall be Meyers hubs or equal on top of enclosure.
7. Joint Compound for IMC or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

J. Clamps, Sleeves, and Supports:

1. Supports:
   a. Single Conduit: Shall be two-hole steel strap, two-hole steel conduit clamp, or steel conduit hanger. GRS and IMC use pipe straps. Conduit hangers shall use nut and bolt to secure conduit. Push-in clip type conduit hangers are not acceptable.
   b. Multiple Conduit: Unistrut trapeze hangers with conduit clamps and threaded rod supports.
   c. Bar joist: Use set screw beam clamps. Do not drill bar joist.
2. Sleeves:
   a. Sleeves passing through exterior walls or floors on/or below grade shall be constructed of galvanized rigid steel, schedule 40 pipe and shall be designed with suitable flange in the

center to form a water proof passage. After the conduit has been installed in the sleeves, the void space around the conduit shall be caulked and waterproof.

b. Sleeves through fire walls shall be galvanized rigid steel.
c. Sleeves through non-rated walls shall be EMT as a minimum.

2.5 METAL SURFACE RACEWAY (WIREMOLD)

A. The metal surface raceway system shall meet all requirements of the NEC Article 386 and shall be listed by UL in compliance for metal surface raceways and fittings (UL-5).

B. Electrical Contractor shall include shop drawings outlining the installation of the raceway system, outlet and jack spacing.

C. Acceptable Manufacturers

1. Wiremold
2. Walker
3. Hubbell

D. Power Systems Only (One Piece) use only with engineer's approval:

1. The surface metal raceway and fittings shall be 700 series as manufactured by the Wiremold Company.
2. The raceway shall consist of a base and cover section factory assembled and designed to accommodate pulling conductors through the raceway. The base section shall have a nominal material thickness of .040" and be painted with a baked enamel finish that is capable of being over-painted in the field if required. Color shall be Ivory.
3. The overall dimensions of the raceway shall be 3/4"w x 21/32"h. A full complement of fittings must be available including, but not limited to, bushings to prevent wire abrasion, single and multiple gang boxes to accommodate device installation for both new work and extensions of existing work, adapters from conduit to raceway, transitions to both larger and smaller surface metal raceways, 90 degree elbows, tees, fixture boxes and flexible sections to allow uninterrupted continuation of raceway along semicircular or curved surfaces.

2.6 TELE-POWER POLES

A. Provide power poles to extend power and communications in locations as shown on the plans. Power poles shall be configured with two 20 amp duplex receptacles and communications outlets as indicated on the drawings and/or as conditions require.

B. Construction: Power poles shall be constructed of .030 inch steel (minimum), baked enamel finish, 2.25 x 2.25 inch cross sectional area, with two compartments. One compartment for power and one compartment for communications. Power poles shall be pre-punched at the factory to accept devices installed in the field. Power pole color shall be as selected by the owner to be determined prior to purchase.

C. The power pole shall be equipped with an adjustable stanchion foot assembly bolted to the floor.

D. Pole height shall be as conditions required and determined in the field.

E. The communications compartment shall be of sufficient size to accommodate all communications wiring and shall not exceed 50% of rated fill capacity, allowing for future expansion.

F. Fittings furnished: Power poles shall be furnished with entrance end fittings for communications and power, ceiling trim plate, pole mounting bracket, 3/8" threaded support rod, foot stanchion, cabling network cover, and any additional hardware or fittings that may be required.

G. Provide power poles as manufactured by one of the following:

1. Wiremold (25DTP-4 Series)
2. Walker (Equal to Wiremold shown above)

2.7 BOXES

A. Boxes shall be as manufactured by one of the following:

1. Appleton
2. Steel City
3. Raco
4. Thomas & Betts
5. Spring City

B. Cabinets, enclosures, and pullboxes shall comply with the following ratings:

1.	Indoor dry:	NEMA-1
2.	Indoor damp:	NEMA-4
3.	Outdoor:	NEMA-3
4.	Corrosive Environment:	NEMA-4X SS

C. General Outlet Boxes: Provide galvanized steel interior outlet boxes, of the type, shape, size, and depth to suit each respective installation. Construction shall be single unit galvanized sheet steel. Sectional or gangable boxes are not acceptable.

D. Accessories: Provide accessories as required for each installation; include mounting brackets, cable clamps, and metal straps for supporting boxes. Accessories shall be compatible with boxes being used and meet requirements of the installation. If the box is to contain both normal and essential power circuits or circuits or different voltages provide barriers to separate circuits within box.

E. Surface Mount, Damp or Wet location: Shall be of cast ferrous or aluminum alloys and shall have threaded hubs with minimum thread depth of 1/2". Box covers shall be galvanized steel, chrome-plated steel, and cast aluminum. Provide gaskets for outdoor and refrigerated locations. No-hub boxes are not acceptable.

F. Junction Boxes and Pull Boxes: Provide galvanized sheet steel junction and pull boxes with screw-on or hinged covers. Size per NEC for power and per EIA/TIA 569 for communications.

G. Conduit Bodies: Provide galvanized cast-metal conduit bodies of the type, shape and size, to suit each respective location and installation. Construction shall be threaded conduit ends, removable cover, and corrosion resistant screws.

H. Bushings, Knockout Closures and Locknuts: Provide corrosion resistant punched-steel box knockout closures, conduit locknuts and malleable iron conduit bushings of the type and size to suit each respective use and installation.

I. Concealed work: Outlet boxes for use in concealed work shall be 1-1/2" deep (minimum) and of sufficient size to accommodate devices and conductors.

J. Recessed switch and receptacle boxes shall be 4 inch square with plaster or masonry rings for single gang installation. Appropriate gang boxes shall be used for mounting ganged switches.

K. Ceiling outlet boxes shall be four inches (4") square x 1-1/2" deep (minimum). Provide 3/8" malleable iron fixture studs and box hangers where required.

L. Outlet boxes mounted in metal stud walls, are to be supported by a stud brace spanning the vertical studs.

M. Outlet boxes that do not receive devices under this contract are to have blank cover plates installed matching wiring device plates.

N. Network Pullboxes:

1. Provide galvanized sheet steel pull boxes with screw-on covers for horizontally mounted pullboxes and hinged covers for vertically mounted pullboxes.
2. Provide pullboxes as shown on the drawings and in conduit where the length of a run is greater than 100 feet, after two 90 degree bends, or if there is a reverse bend in the conduit. Locate pullboxes in straight sections of the conduit. Pullboxes used on raceways 1-1/4 inch trade size and larger shall meet the following criteria:
   a. For straight pull through: the length shall be at least 8 times the trade size diameter of the largest raceway.
   b. For angle and U pulls: Maintain a distance between each raceway entry inside the box and opposite wall of the box of at least 6 times the trade size diameter of the largest raceway, while increasing this distance by the sum of the trade size diameters of the other raceways on the same wall of the box. In addition the distance between the nearest edges of each raceway entry enclosing the same conductor shall be 6 times the trade size diameter of the raceway or 6 times the trade size diameter of the larger raceway if they are different sizes.

2.8 CABINETS AND ENCLOSURES

A. Provide cabinets and enclosures with electrical support racks as required, specified, or shown on plans. Cabinets and enclosures shall be in strict compliance with applicable CSA, UL, and NEMA standards

B. Cabinets shall be constructed of code gauge metal, with hinged and lockable door. Sheet steel cabinets shall be galvanized with ANSI gray primer.

C. Acceptable Manufacturers:

1. Hoffman Engineering Company
2. E.M. Wiegman & Co., Inc.
3. O-Z/Gedney

2.9 SPECIAL PURPOSE OUTLETS

A. Locate special purpose outlets as indicated on the drawings for the equipment served. Location and type of outlets shall be coordinated with appropriate trades involved. The securing of complete information for proper electrical roughing in shall be included as work required under this section of specifications.

2.10 CLASSIFIED AREAS

A. Boxes and enclosures installed in classified areas shall be UL listed for use in hazardous areas. Devices shall meet all the requirements of the division, class, and group of the classified area(s).

2.11 MANHOLES AND HANDHOLES

A. Acceptable Manufacturers

1. Brook's
2. Atlantic Concrete Products
3. Quazite

B. Install nylon wall mounted cable racks in interior of boxes.

C. Conduit entering boxes shall be terminated with bell ends.

D. Handholes: Provide precast handholes formed out of 28 day concrete with a compression 3500 PSI. Handholes shall be provided with traffic rated covers, and pulling irons with open bottom. Covers shall have beaded weld lettering identifying the system enclosed. Handholes interior dimensions shall not exceed 30"w x 48"l x 36"d.

E. Manholes: Provide precast manholes formed out of 28 day concrete with a compression 4000 PSI. Handholes shall be provided with traffic rated covers, pulling irons on all four sides, duct terminators, cable racks, ladders, and open bottom. Covers shall have beaded weld or cast lettering identifying the system enclosed.

F. Quazite fibercrete boxes with same strength as outlined above are acceptable.

2.12 Floor Boxes

A. Flush floor boxes shall be cast iron, watertight, with required brackets and trim. Boxes shall be UL514A and UL514C for scrub water test for carpet and wood floors. Provide floor boxes listed on drawings. If not listed on drawings provide as follows:

1. Power & Communications: Four compartment multi-service, Walkerbox: # RFB4-CI or approved equal. Provide with (2) duplex 20 Amp receptacles.
   a. Accessories:
      1. Flush Activation: recessed, brushed aluminum, tele/data with trim to match flooring and wire management blocks, Walkerbox: #S38CCTCAL or approved equal.
      2. Brackets: (2) duplex receptacle brackets, (2) communications brackets per system requirements (to be coordinated).

2. Power only: Single service, Walkerbox: #880CS series or approved equal. Provide 1, 2, or 3 gang units with 20 Amp duplex receptacle(s) as per application requirements.
    a. Accessories:
        1. Provide brass flanges with brass cover plate(s). Walkerbox: Omnibox flanges to match flooring and #895P duplex cover plate with two (2) screw plug openings.

2.13 CONDUCTORS

A. For line voltages, provide 600 V insulated solid copper wire for size #10 and #12 and all other larger sizes shall be stranded copper wire and cable, NEC standard, of types specified below for different applications with UL label, and color coded as required by governmental agencies having jurisdiction.

B. With conductors No. 4 and larger, provide insulating bushings or insulating sleeves.

C. For wire and cable No. 1 and larger, provide THW, THWN, or THHN.

D. Wires smaller than No. 1 may be THWN or THHN. Identify feeder neutrals with white tape or white paint.

E. Where branch circuit wiring is installed in wiring channels of continuous row mounted fixtures, provide UL type RHH or other approved 90 degree C wires, rated at 600 V.

F. For wire in conduits subjected to direct sunlight, provide THWN or RHWN.

G. Use only copper wires and cables.

H. For wiring installed in areas subject to moisture (i.e. underground conduits) use XHHW or THWN.

I. Provide green grounding conductors in all conduits and raceways sized per NEC table 250.122.

2.14 TIME CLOCKS

A. Provide Tork #EWZ100 series 7-day, astronomical time clock with super capacitor to keep time during power outage.

2.15 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

B. Pull rope: Shall be 1/8" diameter (minimum) nylon.

C. Underground GRS corrosion protection: Shall be alkali and rust resistant bitumastic paint, Koppers No. 50.

D. Concrete patch: Epoxy type.

E. Anti-oxidizing compound: NO-OX or approved equal.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Coordination

1. Coordinate with all other trades to avoid interferences and conditions which will not allow the installation of equipment, conduit, fixtures, etc., as indicated. It shall be the responsibility of the various contractors to accomplish these installations without extra charges. If, in the opinion of the combined trades, an installation cannot be made as shown, the Engineer shall be notified before installation. If interferences are allowed to develop, the Engineer shall decide which equipment must be moved and/or reworked, regardless of which was installed first.
2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.
3. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.
4. Special care shall be given to coordinating with ceiling subcontractor where lay-in fixtures and recessed units require a particular ceiling pattern.
5. Coordinate with mechanical contractor to assure HVAC ducts do not cross over electrical rooms or panels.
6. Contractor shall verify exact equipment, outlet, and switch locations at the job site with architectural shop drawings prior to rough-in. Make appropriate adjustments in the field. No extra compensation will be granted for adjustments to outlet location, as required.

B. Dimensions:

1. The Electrical Drawings are diagrammatic but are required to be followed as closely as actual construction and work of other trades will permit.
2. Where deviations are required to conform with actual construction and the work of other trades, make such deviations without additional cost to the Owner.
3. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction, the drawings and Specifications should be used only for guidance in such regard.
4. Verify all measurements at job site. No extra compensation will be allowed because of differences between work shown on the Drawings and actual measurements at the site of construction.
5. Where outlets are not specifically located on the Drawings, locate in the field under the guidance of the engineer. Where outlets are installed without such specific direction, relocate as directed by the Engineer and at no additional cost to the owner.

C. Branch circuit wiring and arrangement of home runs have been designed for maximum economy consistent with adequate sizing for voltage drops and other considerations. Install the wiring with circuits arranged as shown on the Drawings.

D. Provide power wiring, conduit and connections to all electrically operated equipment and provide disconnecting means, unless specifically indicated otherwise, or furnished as part of factory packaged equipment. Refer to Mechanical and Plumbing plans and Division 23 for equipment requirements and locations. Field coordinate locations of connections and disconnects with installed equipment or installing contractors.

E. Contractor shall check that motors and equipment have proper voltage and phasing to operate, and that each motor has thermal overload protection properly sized to name plate data.

F. Contractor shall review construction documents prior to beginning work and notify engineer of any conflicts or discrepancies for resolution.

G. The contractor at no additional cost will relocate any electrical devices (3) feet as directed by engineer. All devices including systems equipment should be coordinated with Architectural plans to avoid any conflicts. Conflicts noted should be brought to the attention of the Engineer prior to installation.

3.3 INSTALLATION OF DEVICES

A. Receptacles:

1. Install vertically mounted receptacles with ground pin up.
2. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.

B. Switches:

1. Unless otherwise noted, install light switches on the strike side of doors.
2. Snap switches for water heaters shall be motor rated and equipped with pilot light “ON” option.
3. Dimmers:
    1. Install dimmers within terms of their listing.
    2. Verify that dimmers used for fan speed control are listed for that application.
    3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

3.4 GROUNDING SYSTEM

A. Ground all equipment, including switchboards, transformers, conduit systems, motors, and other apparatus, by conduit and conductor.

B. Use driven ground rods, building steel, and metallic water pipe connections to establish service ground.

1. Locate driven ground rods outside the building in areas which will receive water regularly, and drive top of rod to a depth of at least 6" below finished grade. Use copper clad steel rods size as indicated on drawings. Cad weld conductor to ground rod connections.
2. Make meg ground tests to measure ground resistance. Maximum resistance to ground shall be less than 5 ohms.
3. Make ground rods accessible for inspection.
4. Driven ground system shall be (3) 3/4" dia. x 10'-0" ground rods spaced 6'-0" apart in a delta (∆). 5. If specified ground resistance is not obtained drive additional ground rods as directed by the engineer.
5. Bond to building steel and metallic cold water pipe. Determine appropriate bonding points as construction progresses.

C. The interior electrical systems shall be completely and effectively grounded as required by the NEC, local codes, and as specified herein or detailed on the Drawings.

D. All metallic raceways shall be mechanically and electrically connected at all joints and all boxes, cabinets, fittings, and equipment. Metallic raceways shall be connected to a direct ground at the point of electrical service entrance and shall be electrically continuous throughout the entire system.

E. Equipment connected by flexible conduit shall have a full size, but not larger than no. 3/0, ground conductor installed.

F. All ground bus bars shall be bonded to main electrical ground bus bar with minimum 1/0 copper ground, or sized per code, for a continuous copper grounding system. Utilizing building steel or footing is not acceptable

G. Grounding conductors shall be provided in all raceways that contain power conductors.

H. Equipment grounding wire shall be bonded to each panel board and to each metallic enclosure of frame.

I. Bond neutral and ground at the service entrance via a code sized jumper.

J. Inspection Wells: Provide inspection wells for all building grounding system driven rods and lightning protection driven grounding rods.
   1. Non-vehicular traffic areas: Harger GAW910 with HDPE cover.
   2. In concrete or subject to vehicular traffic including maintenance vehicles: Harger traffic rated, GAW121212HD with heavy duty top
   3. Color shall be gray or green and labeled "Ground".
   4. Bolts shall be stainless steel.
   5. Provide gravel base, Stone 57 or similar. Crushed concrete or pea gravel is not acceptable. Provide additional gravel inside inspection well to allow proper drainage.
   6. Ground rod connection shall be above gravel base for easy inspection.

3.5 INTERIOR METAL PIPING SYSTEMS

A. Bond all interior metal piping systems with a bonding jumper sized in accordance with Table 250.66 and as described in Article 250.104 "Bonding of Piping Systems".

3.6 RACEWAY AND CABLE REQUIREMENTS

A. The electrical contractor shall provide raceway with cable provided as noted. Provide for systems as follows:

1. Power: Provide conduit cable and distribution equipment.
2. Fire Alarm: Provide complete conduit system. Approved subcontractor shall provide and install cable and equipment.
3. Security: Provide complete conduit system. Approved subcontractor shall provide and install cable and equipment.
8. Communications (data and voice): For backbone distribution, provide complete conduit system. For horizontal distribution, provide conduit stub-ups at outlet locations, IDF and MDF, sleeving, and conduit in exposed areas. Approved sub-contractor shall provide cable.

3.7 INSTALLATION OF RACEWAYS AND FITTINGS

A. Unless otherwise noted, conduit shall be concealed and outlet boxes flush mounted. Conduit may be exposed and boxes surface mounted in the following areas:

1. Mechanical or machine rooms
2. Electrical rooms
3. Service areas such as elevator shafts or pits.
4. Verify with engineer, areas in which exposed conduit will be allowed prior to beginning construction.

B. Electrical Metallic Tubing (EMT) Conduit:

1. Where conduit is installed concealed in walls, above the ceiling, or exposed in work areas higher than 8’-0” above finished floor, provide steel wall EMT conduit.
2. Except for slab penetrations, exposed conduit in dedicated electrical rooms shall be steel wall EMT.
3. Unless otherwise noted, exterior conduit higher than 8’-0” above finished grade shall be aluminum wall EMT.

C. PVC Conduit:

1. Underground conduit shall be Sch 40 (min) PVC conduit with PVC ells. Minimum size shall be 3/4”.
2. Underslab conduit shall be Sch 40 (min) PVC conduit with PVC ells. Minimum size shall be 3/4”.
3. Conduit poured in slab or concrete duct bank shall be Sch 40 (min) PVC conduit with PVC ells and penetrations (where conduit enters or exits the concrete). Minimum size shall be 3/4”.

D. Galvanized Rigid Steel (GRS) conduit:

1. Make concrete slab penetrations with PVCconduit.
2. Exposed conduit shall be GRS to the first box or panel without transition to EMT. Concealed conduit shall transition to EMT conduit above finished floor.
3. Make roof penetrations with GRS conduit.
4. Exterior conduit lower than 8’-0” above finished grade shall be GRS conduit.

5. Exposed conduit lower than 8’-0” above finished floor in mechanical rooms, machine rooms, or service areas shall be GRS conduit.
6. Any conduit in areas subject to mechanical damage shall be GRS conduit.
7. All conduit in NEC class I or II areas, corrosive environments, or flammable storage areas shall be GRS, with seal-offs.
8. Conduit in areas continuously exposed to moisture shall be GRS conduit.

E. Flexible conduit

1. Use flexible conduit for fixture connection or for installation in existing walls, length not to exceed 6-0”.
2. Use flexible conduit for permanent connection to vibrating or moveable equipment such as; HVAC equipment, motor loads, transformers, kitchen equipment etc. Flexible whips shall not be more than 24” in length.
3. Use galvanized steel conduit with PVC jacket resistant to water, sunlight, and heat in the following areas:
   a. Permanent connections to equipment in kitchens.
   b. Connections to equipment in exterior locations.
   c. Connections to equipment in areas subject to contamination or moisture. These areas include mechanical rooms, machine rooms, service areas, loading docks etc.
4. Where conduit is exposed, run parallel to or at right angles with lines of the building.
5. Make bends with standard conduit elbows or conduit bent to not less than the same radius.
6. Make bends free from dents and flattening.
7. Where conduits pierce the roof, provide 24 gauge galvanized iron roof jacks or approved equal (see General Specifications)
8. Where steel conduit is installed in direct contact with earth or in slab it shall be coated with (2) coatings of approved Bitumastic paint prior to installation. Engineer must inspect conduit prior to covering. First coat shall be allowed to dry before second coat is applied.

F. Underground conduit shall be a minimum of 36" below finished grade. Conduit under slab shall be 6" (minimum) below bottom of slab.

G. Concrete Duct Bank:

1. Conduit encased in concrete shall be installed minimum of 18" B.F.G. to top of concrete.
2. Conduit spacing shall be a minimum of 2".
3. Conduit shall be supported with PVC duct bank spacer 6' on center.
4. Reinforce with #4 rebar 2" in from corners.
5. Provide 2" concrete cover between conduit and edge on duct bank.
6. Concrete shall be 2500 PSI.

H. Exposed conduits and raceways shall be painted to match surrounding conditions with two coats of approved paint.

I. Empty conduits shall have pull rope installed, capped, and labeled for exact locations.

J. Where more than two conduits run parallel, contractor shall use unistrut supports and unistrut clamps to rack conduits. Unistrut supports shall be rigidly secured to building structure.

K. Conduit shall not be installed within 12" of hot water or steam pipes.

L. Conduit interiors shall be clean and dry prior to installation of wire or cables.

M. Minimum conduit size shall be I.A.W. National Electric Code.

N. Where conduit crosses building expansion joints, expansion fittings shall be used. Where conduit crosses separated building canopies that overlap use LB fittings and short sections of weatherproof flexible conduit or expansion fittings (power only).

O. Conduit stub ups:

1. Conduit stub-ups shall extend to overhead support structure such as bar joist, and turn out in a 90° elbow. Turn elbow in the direction of wire pull if possible.
2. Empty conduit stub-ups shall have pull string installed with outlet box covered by blank cover plate to match device cover plates.
3. Terminate conduit stub-ups with insulated throat conduit connector.
4. Minimum conduit stub-up size shall be 3/4” dia. for general services and 1” dia for communications outlets.

P. Metal Surface Raceway:

1. The Electrical Contractor shall provide a complete metal surface mounted raceway system with all associated components as shown on the plans or specified herein.
2. The Electrical Contractor shall coordinate surface metal raceway routing and mounting with architectural details and existing conditions in order to perform the most aesthetically pleasing installation possible.
3. The Electrical Contractor shall paint the raceway system to the engineer's approval. Consult engineer for the type and color paint.
4. Make connections from conduit system to surface metal raceway systems in areas out of public view, preferably in the ceiling space or through wall connections.
5. Unless otherwise noted or approved, outlet sections shall be punched at the factory, and not drilled or formed in the field.
6. Recessed Surface Metal Raceway systems shall be installed using supporting backboards or other approved materials and methods. The intent is to sufficient mounting surface to support the raceway.
7. Method of attachment:
   a. 700 series: Wiremold V5703 supporting clip 24” on center (Max.).
   b. Use 2” Tap-cons on concrete or CMU walls.
   c. Use Rawl: Poly-toggles, Mollies, or toggle bolts on paneling, wall board, Dry wall or other similar material.

Q. Conduit Hangers and Supports:

1. Conduit throughout the project shall be securely and rigidly supported to the building structure in a neat and workman-like manner, and wherever possible, parallel runs of horizontal conduit shall be grouped together on adjustable trapeze hangers. Support spacing shall not exceed (8) feet.
2. Conduit Attachment: Conduit shall be supported by two-hole straps, suitable beam clamps, or trapeze conduit hangers with support rod. Arrangements and methods of fastening all conduit shall be subject to Engineer's direction and approval. Galvanized wire or push-in clip type hangers shall not be used to support or secure conduit.
3. Single conduit (2) inches and larger run concealed horizontally shall be supported by suitable beam clamps or conduit hangers with support rod.
4. Multiple runs of conduit shall be grouped together on trapeze hangers where possible. Vertical runs shall be supported by steel riser clamps spaced at (6) feet (minimum).
5. Conduit (1-1/2) inches and smaller run concealed above ceiling may be supported directly to the building structure with strap hangers support spacing shall not exceed (8) feet.

6. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

R. Classified Areas:

1. Conduit in classified areas shall be rigid metal and grounded to the building ground.
2. Wiring in classified areas must conform to applicable articles of the National Electric Code (NEC).
3. Each conduit run leaving a Class I, Division 1 hazardous area must have a seal fitting installed.
4. The seal fitting should be within six inches of the boundary between the hazardous and non hazardous area. Seal offs should be located in the hazardous area whenever possible. Vertical seal offs are preferred. No union, coupling, box, or fitting in the conduit shall be permitted between sealing fittings and point where the conduit leaves the hazardous location. Seal offs shall be installed following manufactures recommendations.
5. Unless otherwise noted, seal offs shall be EYS type. Acceptable manufactures: Crouse Hinds, Appleton.
6. Sealing compounds shall be approved for the purpose and application and shall not be affected by surrounding conditions. Sealing compounds shall not have a melting point of less than 200 degrees

3.8 CONNECTION OF POWER EQUIPMENT

A. Provide power and control wiring for motor starters and safety switches as shown on the Drawings.

B. Connections to miscellaneous building equipment:

1. Wire and connect to, all items of building equipment not specifically described but to which electrical power is required.
2. Coordinate as necessary with other trades and suppliers to verify types, numbers, and locations of equipment.

3.9 INSTALLATION OF CONDUCTORS

A. General: Install electrical cables, wires and connectors as indicated, in compliance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. General receptacle circuits: The conduit runs are indicated on the Drawings.

1. Where wire size is not shown, install (3) No. 12 type THHN or THWN conductors for all branch circuits, protected by 20 amp circuit breakers..
2. Minimum conduit size shall be 1/2" exposed or concealed in walls and 3/4" underground or underslab.
3. Provide code-sized conduit for number and size wires shown or required, unless a larger size conduit is shown or noted.
4. Where homeruns are to be combined all work must be done in accordance with the National Electrical Code and by the approval of the engineer.
5. Where splices are allowed, make electrically and mechanically secure with pressure type connectors.
6. For wires size 6 AWG and smaller, provide "Scotch-lock" connectors.

7. For wire size 4 AWG and larger, provide Bundy "Versitaps" and heavy-duty connectors, or T & B "Lock Tite" connectors.
8. Insulate all splices and connectors with a minimum of two half-lapped layers of Scotch Branch No. 33 vinyl-plastic electrical tape.
9. Splices shall be made in splice boxes or terminal cabinets. Do not make splices in pull boxes, junction boxes, or hand holes.

C. Tape joints with rubber tape 1-1/2 times the thickness of the conductor insulation, then cover with the friction tape or the vinyl-plastic electrical tape specified above.

D. Circuit and feeder sizes indicated or specified shall not be decreased. Outlets shall be connected to circuits as shown. Unavoidable changes shall be made only after approval by engineer.

E. Color coded conductors as indicated:

	120/208V	277/480V	120/240V
Phase A	Black	Brown	Black
Phase B	Red	Orange	Orange
Phase C	Blue	Yellow	Blue
Neutral	White	Gray	White
Ground	Green	Green	Green

Or wiring color shall match existing.

F. Use same color for same phase throughout. Use different colors for switch legs and travelers. Phase rotation shall be same in all panels. Identify large cables with colored tape. Minimum branch circuit wire shall be #12 AWG. Circuits over 100' to first outlet shall be #10 AWG. Label conductors in junction boxes with panel designation and circuit number.

G. Conductor sizes shown are AWG copper.

H. Conductors #6 AWG and larger shall be continuous from overcurrent device to equipment connection. No splices shall be made without prior approval of the engineer.

I. Immediately prior to installing wiring in underground conduits. Contractor shall clean conduits.

J. No lubricant other than powdered soapstone or approved pulling compound shall be used to pull conductors.

K. Use pulling means, including fish tape, cable or rope that will not damage the raceway. Use nylon fish tape rather than steel fish tape.

L. Provide dedicated neutral to each 120 and 277 volt circuit.

M. Coordinate cable and wire installation work with electrical raceway and equipment installation work, as necessary for proper interface.

N. Pull conductors together where more than one is being installed in a raceway.

O. If more than (3) ungrounded conductors are installed in a single conduit de-rate conductors as per NEC Section 310. Do not install more than (6) ungrounded conductors in a single conduit.

P. Splicing of service and feeder conductors is not permitted.

Q. At least eight (8) inches of slack wire shall be left in every outlet box whether it be in use or left for future connection.

R. Unless otherwise approved, "pig-tailing" shall be the method of connection for electrical devices.

S. Underground conductors shall be buried (36) inches below final grade (unless otherwise noted or approved), covered with a (6) inch wide tape buried (12) inches below finished grade. The tape shall be red with black lettering to read "CAUTION BURIED ELECTRICAL CABLES BELOW".

T. Non-ferrous identifying tags or pressure sensitive labels shall be securely fastened to all cables, feeders, and power circuits in vaults, pull boxes, manholes, switchboards, panels, starters, terminations of cables, etc. Tags or labels shall be stamped or printed to correspond with markings on drawings so that feeder or cable number and phase can be readily identified.

U. Anti-oxidizing compounds: NO-OX or equal.

V. Wire to be connected to lugs at panels, disconnects, starters etc. shall be coated with an anti-oxidizing compound prior to connection. All exterior wire connections are to be coated with anti-oxidizing compound prior to connection.

3.10 BOXES

A. Outlet, stubs, and receptacles required to match appliances, devices or equipment shall be installed with close correlation with supplier layout and connection diagrams. Drawing locations and indications are approximate only and shall not be used for dimension purposes unless dimensions are shown. Exact dimensions shall be as existing in the field. Extra charges for relocation of outlets due to lack of coordination will not be accepted.

B. Outlet measurements are made to center of box and may vary 2" to match block joints, or as required by architectural elements. Close correlation shall be made with architectural details for mounting height and directions.

C. Boxes in masonry wall shall be deep masonry units or have tile rings to avoid offsets or cutting of blocks to install conduit.

D. Boxes shall trim to within 1/8" of finished wall. Boxes shall not extend beyond face of wall. Cut openings for boxes in exposed surfaces to exact size with masonry saw.

E. Provide cast ferrous or aluminum alloy type boxes, with deep threaded internal or external hubs for surface mounted switch, receptacle, or device outlets. No-hub boxes are not acceptable.

F. Exterior outlet boxes shall be waterproof and have weather resistant flip lid cover of cast aluminum or stainless steel.

G. Communications outlet boxes shall be 4-11/16" square x 4-11/16" deep with single gang ring (UNO).

H. General outlet boxes shall be galvanized steel of unit construction sized for NEC wire count and conduit entrances. Sectional or gangable boxes shall not be used.

I. Boxes, other than wall or surface mount, shall be supported and secured as required in NEC 314.13.

J. Pullboxes shall be used only for convenience of pulling conductors. Splices in any boxes are only per approval by electrical engineer.

K. Pullboxes on grade shall have a completely sealed cover to reduce intrusion of water.

L. Floor Boxes:

1. Boxes shall be set and secured before floor or floor topping is poured. Boxes in metal deck with shallow concrete slab shall be cut through deck and secured to allow adjustment of top to match finished floor. Box shall be sufficiently secure, and have adjustments, which will allow the top to be raised and leveled to finished floor. Carpet flanges shall be installed in carpeted areas.
2. Boxes in existing floors shall have additional bracing added to structural supports. Provide fire stopping where boxes penetrate to level below.

M. Handholes:

1. Handholes: Handholes shall be used to expedite the pulling of cable through underground conduit when the total number of bends exceeds 180 degrees or 150 linear feet. Handholes shall be set on a layer of Pee-gravel 12 inches thick (min) and installed per the manufactures instructions.
2. Handholes shall be flush with finished grade.
3. Handholes shall not be used for splicing of cables. Conduit entering a handhole shall be aligned on opposite walls of the hole and at the same elevation.

3.11 STRUCTURAL SUPPORTS

A. The contractor shall design, fabricate and install all additional structural framing required to support any electrical equipment.

B. Framing members shall be standard rolled steel shapes, ASTM A36 steel, except that members welded to main structural members shall be of the same specification as the main structural member.

C. Framing members shall be designed for their actual loads with allowable stresses set forth in the AISC specification and the ALSC Code.

D. Supplementary framing, including design loads, member size and location shall be clearly shown on shop drawings.

E. When supplementary framing is indicated, the contractor shall verify that dimensions are suitable and that framing is structurally adequate for the equipment furnished.

F. No cutting or drilling of holes in structural members will be permitted, except by approval of the Engineer.

3.12 EXCAVATION

A. Provide excavation, backfill and compaction in conformance with other divisions of the specifications.

B. Provide dewatering as required to insure proper installation of duct bank or underground raceway.

C. Cutting of existing concrete slab, sidewalks, etc. shall be from joint to joint (control or expansion). Final surface finish shall match surrounding conditions.

D. Do not cut roots larger than 1/2" in diameter.

E. Hand trench under tree canopies to avoid excessive damage to root systems.

F. Perform required trenching and backfilling associated with the work of division 26.

G. Provide all materials necessary and as required by OSHA to protect personnel working in trenches.

3.13 CONCRETE WORK

A. The Electrical Contractor shall be responsible for all concrete pads, supports, piers, bases, foundations, and encasements required for the installation of electrical equipment and conduit. Concrete pads shall be six (6) inches larger all around than the base of the equipment and a minimum of (6) inches thick unless specifically indicated otherwise. The pad shall have a one-inch chamfer on all exposed edges. Exterior pads shall be sloped three inches per one hundred feet to prevent water accumulation. The pad shall be reinforced with six-inch square, wire reinforcing mesh.

3.14 PAINTING FOR ELECTRICAL WORK

A. Raceways, conduit supports, hangers and surface raceway, where exposed, shall be painted to match mounting surface or surrounding surfaces. Panels and equipment with damaged painted surfaces shall be refinished to present a smooth continuous finish.

B. Requirements for painting and surface preparation shall meet conditions indicated under general conditions of these specifications.

3.15 ACCESS TO ELECTRICAL WORK

A. Provide access panels for concealed junction boxes, ballasts, disconnect switches, or other electrical devices where concealed in areas not otherwise accessible.

3.16 EQUIPMENT AND APPLIANCES

A. Provide power wiring, conduit and connections to all electrically operated equipment and provide disconnecting means, unless specifically indicated otherwise or furnished as part of factory-packaged equipment.

B. Contractor shall check all equipment to insure they are of the proper voltage to operate on this system and that each motor has a thermal overload protection, properly sized to name plate data.

3.17 PENETRATIONS

A. Fire penetrations: Fire stop all fire penetrations I.A.W. published UL standards.

B. Masonry Penetrations: Masonry penetrations to install electrical equipment or materials shall be saw-cut for square or irregular penetrations, masonry drilled for round penetrations 1” diameter or less, or core drilled for round penetrations larger than 1” diameter. Under no circumstances shall masonry penetrations to be chipped or hammered.

C. Conduit stub-outs through floor slabs shall terminate 2" to 4" AFF.

D. Provide necessary sleeves and chases where conduits pass through floors and walls, and provide other necessary openings and spaces as required.

1. Sleeves passing through floors shall be supported above and below slab penetration with strut and conduit clamps.
2. Unless poured in place, sleeves passing through walls shall be supported on both sides of the wall with strut and beam clamps.
3. Wall sleeves shall be installed above ceiling.
4. Provide penetrations and sleeving through walls for free run communications cabling. Field coordinate size and locations with communications contractor. Ream and bush both sides of sleeves.

E. Poke throughs and slab penetrations shall maintain a minimum (2) hour fire rating.

F. Unless poured in place, conduit penetrations entering a building from the exterior shall be sealed with UV resistant silicone and shall be watertight.

G. Conduit entering the building shall be sealed with approved duct seal to prevent intrusion of gas, water, or pests from outside the building.

3.18 PROTECTION OF OWNER'S EQUIPMENT

A. The Contractor shall cover owner’s equipment with a plastic drop cloth while working in an area. Observe additional care to prevent construction debris from settling on computers, copiers, electronics etc.

B. Return furniture and equipment to its original location at completion of work in a particular area.

C. Inform owner when equipment is to be disconnected from power or moved.

3.19 TESTING AND INSPECTION

A. Quality Control:

1. Prior to energization, test cable and wire for continuity of circuitry, and also for short circuits. Correct malfunctions when detected.
2. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

B. Provide personnel, tools, and test equipment required for inspections.

C. Engineer shall inspect contractor's work prior to concealment i.e. underground installations, above ceiling, etc. Contractor shall notify engineer of areas requiring inspection no less than (5) working days prior to requested date of inspection. Upon request by the engineer the contractor shall provide a photographic record of the areas requiring inspection. Photographs shall be dated and fully describe and detail compliance of the installation with the plans and specifications. Photographic documentation may be in lieu of or in conjunction with the engineer's inspection. Photographs shall be delivered to the office of the engineer no later than (10) working days after the date on inspection. Make written notice to the Engineer adequately in advance for inspection of the following stages of construction:

1. Underground prior to covering.
2. Underslab prior to pour, with all electrical work in place.
3. Rough-in is complete, but not covered.
4. Prior to ceiling installation with electrical rough-in complete
5. Prior to trim out.
6. At substantial completion. Engineer will reinspect any deficiencies found during initial inspections.
7. Additional inspections required after the first reinspection because the contractor has failed to correct deficient work shall be considered additional services by the engineer. With subsequent inspections shall be paid by the installing contractor.

D. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such noncompliance remove the noncomplying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the owner.

E. During inspections job site foreman shall accompany Engineer to answer questions or open panels, switchgear, pullboxes, outlets, etc. as requested by the engineer.

3.20 PROJECT COMPLETION

A. Upon completion of the work of this Section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil and other foreign material, and using only the type cleaner recommended by the manufacturer of the item being cleaned.

B. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manuals.

C. Submit the following close out documents for engineers review:

1. Submit (1) copy complete AutoCAD 2017 As-Built drawings and one set of red lines.
2. Measure voltages between phases and between phase wires and neutrals at all motors, panels, and 10% of devices, record and submit these voltages to the Engineer.
3. Submit ground resistance (Megger) test results.
4. Submit (1) copy maintenance manuals

D. In the Engineer's presence:

1. Test all parts of the electrical system and prove that all such items provided under Division 26 function in the required manner.
2. The engineer will randomly inspect the accuracy of the wiring devices circuit number identification on the cover plates. If inaccuracy found, the electrical contractor shall re-check

each device throughout the installation for accuracy of the said identification and replace the cover plate(s) with the proper identification.

END OF SECTION 260500

SECTION 262300 – ELECTRICAL GEAR

PART 1 - GENERAL

1.1 SCOPE

A. Work included: Provide complete electrical services where shown on the Drawings, as specified herein, and as needed for a complete and proper installation to include, but not necessarily limited to:

1. Panelboards
2. Contactors
3. Safety Switches
4. Breakers
5. Fuses
6. Enclosed Circuit Breakers
7. Meters
8. Motor Starters

1.2 RELATED WORK

A. Work as required by other sections of Division 26.

B. Starters, disconnects, connections, and other electrical requirements required by Division 23.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. Applicable sections of Division 26.

C. Applicable sections of Division 23.

1.4 CODES

A. All work shall comply with the requirements of:

1. Florida Building Code, 6th Edition, 2017.
2. State of Florida Community Affairs Energy Efficiency Code for Building Construction (2010).
3. The 2014 National Electrical Code.
4. NEMA PB 2.1 - Proper Handling, Installation, Operation and Maintenance of deadfront switchboards rated 600 Volts or less.
5. Occupational Safety and Health Agency Standards.
6. The Local Authority Having Jurisdiction.
7. Florida Fire Prevention Code, 2017.
8. USF Design and Construction Guidelines.

1.5 STANDARDS

A. Switchgear, breakers, contactors, and starters shall be manufactured according to the latest revision as applicable to each of the following:

1. ANSI/NFPA 70 - National Electrical Code
2. ANSI/IEEE C12.1 - Code for Electricity Metering
3. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems
4. ANSI C39.1 - Electrical Analog Indicating Instruments
5. ANSI C57.13 - Instrument Transformers
6. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches
7. NEMA KS 1 - Enclosed Switches
8. NEMA PB 2 - Deadfront Distribution Switchboards.
9. NEMA PB 2.2 - Application Guide for Ground Fault Protective Devices for Equipment
10. NEMA 250 - Enclosures for Electrical Equipment
11. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies
12. Underwriters Listings - UL 50, 98, 198C, 198E, 489, 891, 943, and 977.

1.6 SUBMITTAL

A. This section is a supplement to all conditions, requirements and procedures outlined in Section 26-05-00 and the General Conditions.

B. At time of submittal, submit bound copies of manufacturer's shop drawings and catalog data for all items to be provided under this section to include the following:

1. Panelboards with breaker layouts
2. Motor Starters
3. Contactors
4. Safety Switches
5. Breakers
6. Fuses with time vs. current curves and fault current study for fuses other than that specified.
7. Enclosed Circuit Breakers
8. Other items specified herein

C. Samples:

1. When so requested by the Engineer, promptly provide samples.
2. When specifically requested by the Contractor and approved by the Engineer, approved Samples will be returned to the Contractor for installation on the project.

1.7 PRODUCT HANDLING AND STORAGE

A. Deliver, store protect, and handle products in conformance with manufacturer’s recommended practices.

B. Store products in a clean, dry, protected area. Maintain factory protection and provide additional protection (cover, barriers etc.) to protect from dirt, water, construction debris, and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.

1.8 WARRANTY

A. All materials and workmanship supplied under this section shall be warranted for (1) year from date of acceptance.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide products that are new, and of the type and quality specified. Where Underwriters' Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.

2.2 MANUFACTURER

A. All Gear (panelboards, safety switches, motor starters, contactors, etc.) shall be by the same manufacturer.

B. Unless otherwise noted, provide products manufactured by the following:

1. I-T-E Siemens
2. Square D
3. General Electric

2.3 ENCLOSURE RATINGS

A. Comply with the following NEMA ratings:

1. Indoor dry: NEMA - 1
2. Indoor damp: NEMA - 4
3. Outdoor: NEMA - 3R
4. Corrosive Environment: NEMA - 4X SS

2.4 IDENTIFICATION

A. General:

1. For disconnect switches, motor starters, transformers, switchboards, motor control centers, distribution and branch circuit panelboards, provide manufacturer’s engraved metallic plates with ratings mounted to unit.
2. Identify panelboards, motor control centers, cabinets, safety switches, motor starters, transformers, contactors, and other apparatus used for operation and control of circuits, appliances, and equipment with plastic laminate nameplates, black face with white core letters, showing proper and complete identification.
3. Provide panelboards with permanent breaker space numbering and typed panel directory with complete description of load being served. Directory description shall contain type load (receptacle, light, etc.) and location (room numbers or description).
4. Identify each breaker on service entrance switchboard or panel with plastic laminate nameplates indicating load and circuit number.

2.5 PANELBOARDS

A. Provide panelboards as specified on the panel schedules and in the locations as shown on the plans.

B. Panelboards shall be fully rated.

C. Branch Panelboards:

1. Provide panelboards for voltages as 240/120, 208/120, or 480Y/277 volts.
2. Main Circuit Breaker: Where specified provide main circuit breakers of the size shown on the drawings.
   a. Provide thermal-magnetic molded case circuit breaker with a minimum ampere interrupting capacity as shown on plans.
3. Bussing: Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the drawings. Bus bars shall be continuous copper without reduction. Tapered and Aluminum bussing shall not be allowed.
4. Cabinets and Fronts:
   a. Provide surface or flush mounted cabinets as shown on the drawings, constructed per U.L. Standard 50.
   b. Wiring gutter space shall be I.A.W. UL Standard 67, with minimum 4” on each side. Minimum width shall be 20”.
   c. Fronts shall include door, stainless steel door pull, and lock.
   d. All panelboard locks shall be keyed alike.
   e. Provide panelboard with a circuit directory frame, typed directory card,

and clear plastic covering on the inside of the door.

   f. Boxes shall be made from unpainted galvanized code gauge steel, with non-removable box ID sticker.
   g. Front shall suit mounting application.
5. Neutral and Ground Bars: Shall be copper. Neutral bar shall be mechanically and electrically isolated from ground bar. Neutral shall be full length.
6. Wire entrance: As shown on plans.
7. U.L. Listing: Panelboards shall be listed by underwriters laboratories and bear the UL label.
8. All branch circuit breakers serving fire alarm panels including NAC panels shall be lockable and red in color.

2.6 SERVICE ENTRANCE AND DISTRIBUTION SWITCHGEAR

A. Entrance and Distribution Panelboard:

1. Distribution panelboards shall be fully rated.
2. Main Distribution panelboards shall be of the size and type as shown on the drawings. Panelboards shall be of the deadfront design equipped with thermal magnetic, molded case circuit breakers of the frame and trip ratings shown on the plans.
3. Main Circuit Breaker: Where specified provide main circuit breakers of the size listed on the panel schedule.
   a. Main circuit breaker: provide thermal-magnetic molded case circuit breakers with solid state trip. Minimum amperes interrupting current rating shall be 42,000 RMS symmetrical amps for 120, 208, or 240 VAC systems, and 25,000 RMS symmetrical amps for 480 VAC systems. Provide higher AIC ratings if required.
4. Bussing: Bus structure shall be full size and have current ratings as shown on the drawings. Bussing constructed of plated copper without reduction, Tapered or Aluminum bussing is not permitted. Ratings shall be established by heat rise tests with maximum hot spot temperature

on any connector or bus bar not to exceed 50°C. Rise above ambient. Heat rise test shall be conducted I.A.W. Underwriters laboratories standard UL-67.

5. Cabinet and front:
   a. Panelboard shall be enclosed in a steel cabinet manufactured per U.L. Standard 50.
   b. The size of wiring gutters shall be in accordance with U.L. Standard 67.
   c. Cabinets shall be equipped with latch and tumbler-type lock on door.
   d. Doors over 48" long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike.
   e. End walls shall be removable and fronts shall be of code gauge steel.
   f. Exterior surfaces shall be gray baked enamel finish electro-deposited over cleaned phosphated steel.
6. Neutral and Ground Bars: Shall be copper. Neutral shall be full length.
7. Wire entrance: As shown on drawings.
8. U.L. Listing: Listed by underwriters laboratories and bearing the UL label. Panelboards shall be suitable for use as service equipment.

2.7 CIRCUIT BREAKERS

A. General:

1. Breakers of like frame sizes shall be interchangeable as standard, with no special structure or bracing required.
2. Circuit breakers shall be molded case, thermal magnetic with trip current ratings as shown on drawings.
3. Circuit breakers shall have an over center, trip free, toggle operating mechanism which will provide quick-make, quick-break contact action with positive indication of breaker status.
4. Handles shall have "ON", "OFF", and "TRIPPED" positions.
5. Double and triple pole breakers shall be of the common trip, single handle type. Two or three single handles tied together will not be accepted.
6. Circuit breaker handle accessories shall provide provisions for locking handle in the “ON” or “OFF” position.
7. Circuit breakers shall be bolt-in type.
8. Automatic Transfer switches circuit breakers shall be of the current limiting type with let thru not to exceed 12,000 Amps

B. Distribution or Service Panelboard Circuit Breakers:

1. Circuit breakers shall be equipped with individual insulated, braced and protected connectors.
2. Circuit breakers shall have factory installed mechanical lugs.

C. Branch Panel Circuit Breakers:

1. Panelboards with an operating voltage of 120/240, 240/120 or 208Y/120 volts: Provide breakers with a minimum A.I.C. rating 10,000 RMS symmetrical amperes.
2. Panelboards with an operating voltage of 480Y/277 volts: Provide breakers with a minimum A.I.C. rating of 14,000 RMS symmetrical amperes.
3. Lighting: 15 and 20 ampere circuit breakers intended to switch fluorescent lighting loads shall be listed SWD rated.
4. HACR: 120/208 volt breakers with an AIC rating of less than 22,000 Amps used to switch air conditioning, heating, and refrigeration equipment shall be HACR rated.

2.8 SAFETY SWITCHES

A. Safety switch Amp rating shall be equal to or greater than the circuit serving it.

B. Neutral and Ground Lugs: Shall be solid copper. Neutral lug shall be insulated from enclosures with factory insulators.

C. Switch mechanisms: quick-make, quick-break design.

D. Padlocking provisions shall be provided for padlocking in the OFF position.

E. Switches shall be horsepower rated for 600 volts ac or dc as required.

F. Lugs shall be U.L. Listed for 75°C, copper conductors.

G. Cover shall be interlocked with mechanism to prevent opening unless switch is in the "OFF" position.

H. Enclosures shall be "bonderized" or equal, primed and finished to resist rusting and corrosion. Mounting and enclosure shall be per environment and area finish.

I. Duty: Provide NEMA type HD, heavy duty safety switches.

J. Fuses

1. Fuses shall be standard National Electrical Code Cartridge Type, Class R, dual element unless otherwise indicated.
2. Fuses shall be rated for 125% of the name plate full load amps (FLA) of the equipment installed. This criteria shall be verified in the field once the equipment is installed and may not necessarily be the same as shown on drawings.
3. For above 600 amps, provide Class L “Low Peak” KRP-C as manufactured by Bussman, or equal manufactured by Chase-Shawmut.
4. For below 600 amps, as shown for short circuit duty, provide RK-1 “Low Peak” as manufactured by Bussman, or equal manufactured by Chase-Shawmut.

2.9 STARTERS

A. General: Provide units of the sizes and types needed for the operations shown on the Drawings, specified herein, and otherwise required for the facility. Motor starters shall comply with the following:

1. Comply with pertinent requirements of NEMA and NEC.
2. Include required accessory items.
3. Horsepower rated, with solid state electronic thermal overloads and with double-break contacts capable of interrupting 10 times the rated motor current.
4. Starters shall be manually reset without entering the starter enclosure.
5. Equipped with thermal overloads in each ungrounded leg.
6. Motor starters shall be NEMA rated.

B. Manual starters:

1. For both single-phase and three-phase starters, provide units that open all ungrounded conductors simultaneously.
2. Fractional Horsepower Starters:
   a. Toggle switch.

b. Units shall clearly indicate “ON”, “OFF” and “TRIPPED”.
c. Solid State Electronic Alloy thermal overload protection.
d. Handle guard with locking facilities.
e. Material Standard: Square-D: Class 2510, 2511, or 2512, Type F and K.

3. Three-phase Starters or Integral Horsepower:
   a. Pushbutton operated units with START, STOP-RESET button on the enclosure cover.
   b. Units shall clearly indicate “ON”, “OFF” and “TRIPPED”.
   c. Melting Alloy thermal overload protection.
   d. Material Standard: Square-D: Class 2510, 2511, or 2512, Type M or T.
4. Thermal overload switches (manual starters) shall be rated for the horsepower, voltage and current imposed.
5. Mounting and enclosure shall be per environment and area finish.
6. Provide manual starters with factory installed red “ON” neon pilot light.

C. Magnetic Starters:

1. Unless otherwise noted, magnetic motor starters shall be full voltage across-the-line, non-reversing, rated for the equipment served.
2. Contacts shall be double break silver alloy. Contacts shall be replaceable from the front without removing the starter from the enclosure.
3. Thermal overload protection shall be solid state type.
4. Unless otherwise noted, provide Hand-Off-Auto (HOA) selector switch in cover.
5. Provide built-in under voltage release.
6. Provide units with the accessories and auxiliary contacts needed for proper control function.
7. Control circuit voltage shall match voltage and ratings of control apparatus/system.
8. Provide fuses and control transformers to supply correct control voltage, as required. Elements located near boilers, heat strips, duct heaters or other heat sources or where heating by conduction or radiation can occur, shall be ambient temperature compensated types.
9. Loss of Power:
   a. Starters for motors 10 HP or less shall be connected to automatically return the motor to service after a power interruption.
   b. Starters for motors over 10 HP shall be equipped with time delay relays so that after a power resumption and after a present delay of 0 to 30 seconds, the motor shall automatically be returned to service.
10. Motor starter coils shall be quiet and shall emit no distracting noise or hum. Each starter located within or adjacent to a quiet area shall cause a sound pressure level of less than 20 decibels, related to 0.0002 microbar.
11. Starters shall be provided with minimum of two auxiliary contacts.
12. Mounting and enclosure shall be per environment and area finish.
13. Refer to division 23 for additional requirements.

D. Combination Starters:

1. Provide units complying with requirements for magnetic starters and, in addition, with fusible safety switch sized per the load being served and complying with NEC requirements for the motor being operated.

2.10 CONTROL RELAYS

A. Control relays shall be a standard general purpose lighting contractor with (2) to (12) 30 amp poles, electrically or mechanically held (to be coordinated), normally closed. Install in NEMA-1 terminal cabinet located above the ceiling. Coordinate configuration and control voltage. Provide 20% spare poles in each terminal cabinet.

2.11 CONTACTORS

A. Multi-pole Contactors:

1. Description: Magnetic lighting contactor.
2. Coil/control voltage: Per system requirements, refer to plans.
3. Poles: (2) to (12) as required with (2) spare poles per contactor.
4. Configuration: Electrically held with continuously rated encapsulated coils.
5. Contact Rating: 30 Amp minimum for all types of ballast and tungsten lighting. As per circuit requirements for resistive heating, and motor loads.
6. Contacts: Field replaceable totally enclosed, double break silver-cadmiumoxide power contacts. Contacts shall be field convertible (N.O. or N.C.).
7. Wiring: Straight-through wiring with all terminals clearly marked.
8. Enclosure: ANSI/NEMA ICS 6 as required to meet conditions of installation.
9. Accessories:
   a. Hand/Off/Auto selector switch.
   b. Indicating light.
   c. Disconnecting means in same enclosure.

B. Panelboard Lighting Contactors:

1. Description: NEMA ICS 2, magnetic lighting contactor.
2. Coil/control voltage: Per system requirements, refer to plans.
3. Poles: (2) pole for single phase panels and (3) poles for three phase panels.
4. Configuration: Electrically held and electrically operated with continuously rated encapsulated coils.
5. Contact Rating: As per circuit requirements, refer to plans.
6. Contacts: Field replaceable totally enclosed, double break silver-cadmiumoxide power contacts.
7. Wiring: Straight-through wiring with all terminals clearly marked.
8. Enclosure: ANSI/NEMA ICS 6 as required to meet conditions of installation.
9. Accessories:
   a. Hand/Off/Auto selector switch.
   b. Indicating light.
   c. Disconnecting means in same enclosure.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions to receive electrical gear to assure adequate clearance is provided for proper installation. Correct deficiencies prior to installation.

3.2 GENERAL

A. Install equipment specified in part 2 in accordance with manufacturer’s written instructions, applicable NFPA requirements, and as specified herein.

B. Switches, panels, enclosures etc. shall be securely fastened to mounting surface and shall be

plumb.

C. Provide minimum of (2) additional horizontal supports for equipment surface mounted to stud or furred walls. Mount between vertical studs or furring strips prior to installation of the wall covering (drywall). Gear shall be fastened to horizontal supports with appropriate fasteners.

D. Install all electrical equipment, switchboards, panelboards, etc. to comply with the working space requirements of NEC-26 and the width and depth zone as outlined in NEC-408 with no piping, ducts, plumbing, ventilation, etc. Intruding into this dedicated zone as indicated in this section.

3.3 PREPARATION

A. Coordinate

1. Coordinate as necessary with all other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
2. Coordinate the installation of electrical items with the schedule for work of other trades to prevent unnecessary delays in the total work.

B. Data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not warranted. The exact locations, distances, levels, and other conditions will be governed by actual construction and the Drawings and Specifications should be used only for guidance in such regard.

C. Coordinate electrical gear installation with electrical raceway and cable work for proper interface.

D. Before pulling wiring to any equipment, check the equipment name plate for required voltage, starter, thermal overload, and required maximum overcurrent protection. If conflict arises between bid documents requirements and equipment delivered to the field, contact engineer for directives.

3.4 POWER EQUIPMENT BY OTHER TRADES

A. Provide starters, contactors, and/or safety switches for equipment installed by other trades requiring such items for proper operation. Refer to plans and division 23 for additional requirements.

B. Coordinate as necessary with other trades and suppliers to verify types, numbers, and locations of equipment.

3.5 PANELS

A. Unless otherwise shown on the Drawings, install panels with the top of the trim 6'-0" above finished floor.

B. Mount a typewritten laminated directory behind plastic on the inside of each panel door, show the circuit number and complete description of all loads on each circuit.

C. Provide (3)-3/4" dia. spare conduits stubbed out of the top of each flush-mounted panel, terminated and capped in accessible ceiling space, each conduit tagged with panel description.

Provide (2)-3/4" conduits stubbed into ceiling space below.

D. Torque bus and wire connections to manufacturers specifications.

E. Existing panels:

1. Install Circuit breakers in existing panels as called out on plans or required.
2. Modify bussing and provide lugs as required.
3. The contractor shall clean inspect and repair existing panels modified under this scope of work.
4. Update panel directory to reflect current installation with new typewritten laminated directory.

3.6 DISCONNECTING SWITCHES

A. Paint fire alarm safety switch red and label “FIRE ALARM”.

B. Unless otherwise noted, provide and install safety switches for motor-driven equipment within sight of the controller.

C. Outdoor disconnect switch enclosures shall be painted with a clear UV stabilized rust inhibiting sealer. Paint all surfaces exposed to the elements prior to installation. Painting shall not interfere with switch operation or access into the enclosure.

3.7 STARTERS

A. Verify control voltages prior to ordering.

B. Provide starters for all equipment requiring starters for proper operation.

C. Size thermal protection to match equipment requirements.

3.8 ADJUSTMENT, TOUCH-UP, AND CLEANING

A. Adjust operating mechanisms for free mechanical movement.

B. Tighten all lug connections and mechanical fasteners.

C. Clean all dust and construction debris out of enclosures and vacuum thoroughly.

D. Touch-up scratched or marred surfaces to match original finish.

E. Clean exteriors of panels and equipment.

3.9 ENERGIZING, TESTING, AND INSPECTIONS

A. Transformers:

1. Upon completion of installation of transformers, energize primary circuit at rated voltage and frequency from normal power source. Test transformers for audible sound levels, demonstration of capability and compliance with requirements, and secondary voltage levels

at load. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Panels and Switchboard:

1. Test all breakers for proper operation.
2. Inspect interiors, breakers, and connections for abnormal heating after a minimum of (3) hours of operation.
3. Balance phase legs at each panel under full load. Adjust phasing to have less than 10% current deviation between each leg.
4. Perform voltage and current testing under no load and full load at all panels. Record voltage and current readings for engineers review. Balance as per the engineer's direction.
5. Adjust breaker current and voltage settings to the proper values.
6. Test and inspect GFI protection system in accordance with manufacturer's instructions.

C. Starters:

1. Test starters for proper operation.
2. Inspect for abnormal heating during all phases of operation.

D. Correct all deficiencies discovered during testing and inspections.

END OF SECTION 262300