Green Hall HVAC Upgrades

TCNJ Advertised Bid # AB220031

COVER SHEET

INVITATION TO BID

MILESTONE SCHEDULE

CONSTRUCTION BID PROPOSAL FORM

GENERAL WORK DESCRIPTION

CONTRACT

MANDITORY DOCUMENTS

GENERAL CONDITIONS

March 10, 2022

Please place the following advertisement in the Legal Section of Classified Advertising. Please ensure that the invoice for this advertisement is prepared and an affidavit forwarded to The College of New Jersey, Office of Finance and Business Services, Administrative Services Building, Room 201, P.O. Box 7718, Ewing, NJ 08628-0718.

To be published on **March 10, 2022 in the Trentonian.** Contact person regarding placement of ad is Anup Kapur (609) 771-2495.

THE COLLEGE OF NEW JERSEY
ADVERTISEMENT FOR BIDS
BID #AB220031

Under the provisions of the State College Contracts Law, Chapter 64 of Title 18-A, The College of New Jersey will receive sealed bids for the **Green Hall HVAC Upgrades** project until **2:00 P.M. on the 4th day of April, 2022** at The College's Office of Finance and Business Services, Administrative Services Building, Second Floor, Room 201, Route 31 (Pennington Road), Ewing Township, New Jersey. At 2:00 P.M. all bids will be publicly opened and read in Room 203 of the Administrative Services Building.

The project will be bid as a Single Lump Sum. No bidder may submit more than one bid.

Bid Documents may be obtained on/after **March 10, 2022 via our website (https://bids.tcnj.edu/home/construction-projects/).**

Bidders are encouraged to attend the **pre-bid conference/on-site inspection on March 16**, 2022 at 9:00 a.m. at the College's Administrative Services Building, Room 203.

Bidders are required to comply with the requirements of P.L. 1975 c. 127 (N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 - Affirmative Action); the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq.; N.J.S.A. 52:25-24.2, "Statement of Ownership Disclosure"; the Public Works Contractor Registration Act (N.J.S.A. 34:11-56.48 et seq.); the New Jersey Business Registration of Public Contractors provisions (N.J.S.A. 52:32-44); Executive Order 117 and P.L. 2005 Chapter 51 (N.J.S.A. 19:44a-1 et seq.) and all amendments thereto

Bidders must possess one of either a New Jersey Department of Treasury, Division of Property Management and Construction (DPMC) C032 classification at time of bid. No bids will be accepted without this classification.

A bid bond is required in the amount of 10% of the total bid. Bid bond shall consist of a certified check or cashiers check to the order of The College of New Jersey, or an individual or annual bid bond issued by an insurance company or surety company authorized to do business in the State of New Jersey. The successful Bidder(s) is required to provide a Performance and Payment Bond equal to 100% of the contract. A Surety Disclosure Statement and Certification form must accompany the performance bond.

The College will award the contract to the lowest responsible bidder who satisfies the qualification criteria as set forth in the contract documents.

The College of New Jersey reserves the right to reject all bids or to waive any minor informalities in the bidding in accordance with law. No bid shall be withdrawn for a period of sixty (60) days subsequent to the opening of bids without the consent of The College of New Jersey.

Green Hall HVAC

MILESTONE SCHEDULE

Bids Released	3/10/22
*Pre-bid Meeting, 9 am, ASB 203	3/16/22
Last day for questions	3/21/22
Addendum issued, if needed	3/24/22
Bids due to TCNJ	4/4/22
Notice of Intent to Award Issued	4/5/22
End of Protest Period	4/12/22
Notice to Proceed Issued by	4/13/22
Kick-off Meeting	4/20/22
Submittals	4/25/22 - 5/6/22
Order AHU's, Ductwork and compressors	5/9/22
Fabricate Ductwork and Delivery of AHU's	5/9/22 – 7/15/22
Mobilize and Start construction	7/18/22
Demo AHU#3 and Ductwork (Development Office)	7/25/22 - 8/5/22
Install AHU#3 and Ductwork	8/8/22 – 8/19/22
AHU#3 system balanced and operational	8/22/22 – 8/24/22
Demo AHU#7 and Ductwork (Provosts Office)	8/8/22 - 8/19/22
Install AHU#7 and Ductwork	8/22/22 – 9/2/22
AHU#7 system balanced and operational	9/5/22 – 9/7/22
Demo AHU#4 and Ductwork (Treasurer's Office)	9/22/22 - 10/10/22
Install AHU#4 and Ductwork	10/6/22 - 10/19/22
AHU#4 system balanced and operational	10/20/22 – 10/24/22
Honeywell Integration and Final test & Inspection	10/28/22 - 11/3/22
Substantial Completion	10/24/22
Project Closeout by	11/15/22 – 12/14/22

*The Pre-bid meeting is not mandatory, but attendance is recommended. The meeting will be held in Administrative Services Building, **Room 203**. Parking is available at the building. We will briefly review the RFP, answer questions, and then take a tour of the building.

THE COLLEGE OF NEW JERSEY
Construction Bid Proposal Form

Office of Finance & Business Services
Administrative Services Building, Rm. 201
2000 Pennington Road
Ewing, New Jersey 08628-0718

Bid Number: AB220031
Bid Due Date: April 4, 2022

Project Name: Green Hall HVAC Upgrades

BIDDER INFORMATION

Firm Name:

Contact Person:
Address:

Telephone Number:

Fax Number:

Email Address:
Federal I.D. Number:

SOLICITATION OF CONSTRUCTION BIDS

1. **Bid proposals are solicited as follows:**
   - **A. Single Bid (Lump Sum) which combines all trades.**
     - **(1) The total number and types of trades are set forth in the Specifications.**
     - **(2) Bidder enters the Bid Price on the line provided.**
     - **(3) Pursuant to the requirements of N.J.S.A. 18A:64-76.1., bidder lists the names of the subcontractors on the Subcontractor Information page.**

2. **The scope of work includes replacement of three (3) air handling units and their associated ductwork and compressors in the Green Hall attic and roof. This will include the removal of existing units and their disposal offsite.**
   - **A. See Specifications and Drawings for Details (included in RFP package).**
   - **B. The College may issue Addenda or Clarifications which may include additions to or deletions from the scope of work; changes to the Specifications, Drawings, and proposal form; and clarifications of requirements. Bidder is advised to review all Addenda and/or clarifications carefully, and shall note the receipt of same with their bid package.**

GENERAL INSTRUCTIONS AND REQUIREMENTS

1. PRICES

A. Bidder submits prices for the Base Bid and any Alternate Proposals and Unit Prices which are listed for the contract of the bid. If there is no cost associated with the Alternate or Unit Price, bidder is required to enter "0.00" or "no change".

B. Prevailing wage rates apply (Mercer County).

C. Bid is to remain good for sixty (60) days after the Bid Due Date.

2. BOND REQUIREMENTS AND SURETY STANDARDS

A. Bidder must submit with its bid a Certified Check in the amount of ten percent (10%) of the total bid, or a Bid Bond in the amount of ten percent (10%) of the total bid.

B. The successful bidder must submit a Performance and Payment Bond equal to 100% of the contract. A completed Surety Disclosure Statement and Certification must accompany the Performance and Payment Bond.

(1) The Performance and Payment Bond form and a sample Surety Disclosure Statement and Certification form are included at the end of this Construction Bid Proposal Form.

C. All bid deposits shall be returned within three (3) days, Sunday and holidays excepted, after the awarding of the contract and the approval of the successful bidder's performance bond, if any, the bid guaranty of the remaining bidders shall be returned to them.

D. Should the successful bidder fail to enter into said contract after acceptance of bid by the College, then the check or security deposited by that bidder shall, at the option of the College, be retained as liquidated damages, or if Bid Bond has been supplied, principal and surety shall be liable to the amount of the Bid Bond.

E. Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified copy of their Power of Attorney to sign said bonds.

3. LICENSES, CERTIFICATIONS, REGISTRATIONS, QUALIFICATIONS

A. The bidder or, as applicable, its subcontractors shall at the time of bid have those required licenses, certifications, registrations, qualifications and the like ("LCRQ") listed below and shall present satisfactory evidence thereof upon request of the College prior to the notice of intent to award.

(1) The electrical contractor or subcontractor as applicable shall have a valid electrical license. (An electrical license is not required when the work is below 110Volt)

(2) The plumbing contractor or subcontractor as applicable shall have a valid plumbing license.

(3) The HVACR contractor or subcontractor as applicable shall have a valid HVACR license.

B. The selected bidder/contractor or, as applicable, its subcontractors shall have and shall present satisfactory evidence of all other required LCRQ noted in the Specifications after execution of contract during the submittal process and prior to

the start of the applicable work, unless otherwise requested by the College or a date or event specified for that LCRQ in the Specifications.

4. SUBCONTRACTORS

A. Pursuant to New Jersey State Law (N.J.S.A. 18A-76.1), a Single Bid (Lump Sum) bidder discloses its subcontractors to whom the bidder intends to subcontract the work. The Subcontractor Information sheet is provided for this purpose.

5. Under Executive Order 34, the College is responsible for soliciting demographic information from its vendors. The College is required to seek the following information from each firm under contract with the College:

1. Is more than fifty percent (50%) of your company minority owned? (circle one) YES NO (African-American, Hispanic, Asian, and/or Native American)

2. Is more than fifty percent (50%) of your company woman owned? (circle one) YES NO

3. What is the ethnicity of the owner of your company: (check applicable according to 51% ownership)

☐ Asian American
☐ Multiple Ethnicities
☐ Non-Minority
☐ Hispanic American
☐ African American
☐ Caucasian American Female
☐ Native American
☐ Unspecified

The College is required to solicit the foregoing information. Your response, however, is **strictly voluntary**. Please be advised that any contracting decisions made by the College will **not** be influenced in any way by your decision to provide the above information.

EXECUTIVE ORDER #34: MINORITY AND WOMEN BUSINESS ENTERPRISES

On September 15, 2006, Governor Corzine signed Executive Order 34 establishing a Division of Minority and Women Business Development. The Division is charged with administering and monitoring policies, practices, and programs to ensure that minority and women business enterprises (MWBE) are afforded an equal opportunity to participate in New Jersey's purchasing and procurement processes.

State entities are required to report to the Division the ethnic and gender composition of the vendors with which those state entities do business.

6. Bidder completes and submits the Statement of Ownership Disclosure form and the Non-Collusion Affidavit form along with bid proposal.

7. Bidders are required to be registered with the New Jersey Department of Property Management and Construction (DPMC) and possess a **DPMC C032** classification at the time of bid submission.

8. **SET ASIDE PROGRAM FOR SMALL BUSINESS ENTERPRISE (SBE) – CONSTRUCTION**

In accordance to N.J.A.C., 17:14-1.2 et seq. and Executive Order 71, signed by Governor James E. McGreevey in 2003, the College requires bidders to make a good faith effort to provide opportunities for Small Business Enterprises (SBE) to participate in the performance of this contract as subcontractors consistent with the overall goals established for construction services by the New Jersey Commerce and Economic Growth Commission (NJ Commerce).

SBE subcontracting goals are not applicable if the bidder is currently registered with NJ Commerce as an SBE firm.

9. **PREVAILING WAGE AND PUBLIC WORKS CONTRACTOR REGISTRATION ACTS**

- The work described in this project is subject to the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 et seq. and the Public Works Contractor Registration Act, N.J.S.A. 34:11-56.48 et seq.
- The Public Works Contractor Registration Act requires the bidder and any subcontractors listed in the bid to be registered with the New Jersey Department of Labor and Workforce Development at the time the bid is submitted. The contractor must submit registration certificates for all listed subcontractors prior to award of the contract.
- The Contractor must comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 through 56.47. Workers employed by the Contractor or any subcontractor or sub-subcontractor in the performance of services directly on the project must be paid prevailing wages. As required by N.J.S.A. 34:11-56.27 and 56.28, this contract cannot become effective until the College obtains from the New Jersey Department of Labor and Workforce Development a determination of the prevailing wage rates applicable to the project as of the contract award date and attaches a copy to the contract. As required by N.J.S.A. 34:11-56.27, the Contractor or any subcontractor may be terminated if any covered worker is not paid prevailing wages on the project, and the Contractor and its surety shall be liable for any additional costs which result. The Contractor and its subcontractors must be registered with the New Jersey Department of Labor and Workforce Development (N.J.S.A. 34:11-56.51 et seq.), and the prevailing wage rates must be posted at the job site (N.J.S.A. 34:11-56.32). The Contractor and its subcontractors must prepare accurate certified records of wages paid for each worker on the project (N.J.S.A. 34:11-56.29), and copies for the period covered by each invoice must be attached to the invoice submitted under the contract. In accordance with N.J.S.A. 34:11-56.33, the Contractor's final invoice must include a statement of all amounts still then due to workers on the project. The Contractor is also cautioned that it must use job titles and worker classifications consistent with those approved by the Department of Labor and Workforce development, and that, if it intends to pay apprentice rates, it must comply with the Department of Labor and Workforce Development regulations at N.J.A.C. 12:60.

- Please refer to http://lwd.dol.state.nj.us/labor/wagehour/wagerate/wage_rates.html for official wage rate determinations for Mercer County, NJ.

10. NEW JERSEY EQUAL PAY ACT

On April 24, 2018, Governor Phil Murphy signed into law New Jersey's Diane B. Allen Equal Pay Act (P.L. 2018, c. 9) The law provides in pertinent part that as of July 1, 2018, any employer entering into a contract with the State of New Jersey or an instrumentality of the State for "qualifying services" or "public works" must provide to the Department of Labor and Workforce Development – upon commencement of the contract – wage and demographic data for all employees who are employed in connection with the contract (for public works) and for all employees (for qualifying services). This requirement DOES NOT apply to employers who are contracting with local governments (for example: municipalities and counties). The report must contain the gender, race, ethnicity, job category, compensation, and number of hours worked by each employee.

The extent of the Department of Labor and Workforce Development's responsibilities under the Equal Pay Act is the collection of data regarding compensation, hours worked, job/occupational category, job title, gender, race, and ethnicity for State contactors and making that data available to the Division on Civil Rights (DCR), within the Department of Law and Public Safety, and upon request to certain individuals. Complaints of unlawful discrimination under the Equal Pay Act should be directed to the DCR, as should any questions regarding the filing of such a complaint.

The Department of Labor and Workforce Development has issued two forms, as required by the law, to be completed by employers. The forms should be used to report the employee's wage and demographic data and can be found on the LWD website (http://www.nj.gov/labor/equalpayact). **A completed copy of the forms is not required at time of bid; however, it will be required of the bidder who receives the notice to proceed from the College. Completed forms should be emailed to: equalpayact@dol.nj.gov**

11. In order for your proposal to be accepted and deemed valid, your company/firm will be required to comply with the requirements of N.J.S.A. 19:44A-1 et seq/P.L. 2005 Ch. 51 ("Chapter 51") and Executive Order 117. Enclosed are the requirements of Chapter 51 and Executive Order 117, the forms for Certification and Disclosure. The contract that will be generated based on this bid proposal cannot be awarded without approval of the Certification and Disclosure forms by the State of New Jersey, Department of Treasury. **A completed copy of your Certification form is not required at time of bid; however, it will be required from the bidder who receives the notice of intent to award from the College prior to the execution of the contract**.

12. Pursuant to N.J.S.A. 52:32-44, The College of New Jersey ("Contracting Agency") is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in

a bid/proposal/contract has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to contract award or authorization, the contractor shall provide the Contracting Agency with its proof of business registration and that of any named subcontractor(s).

Subcontractors named in a bid or other proposal shall provide proof of business registration to the bidder, who in turn, shall provide it to the Contracting Agency prior to the time a contract, purchase order, or other contracting document is awarded or authorized.

During the course of contract performance:

(1) the contractor shall not enter into a contract with a subcontractor unless the subcontractor first provides the contractor with a valid proof of business registration.
(2) the contractor shall maintain and submit to the Contracting Agency a list of subcontractors and their addresses that may be updated from time to time.
(3) the contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

Before final payment is made under the contract, the contractor shall submit to the Contracting Agency a complete and accurate list of all subcontractors used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a business registration as required, or that provides false business registration information, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000, for each proof of business registration not properly provided under a contract with a contracting agency.

13. Record Retention: Pursuant to N.J.A.C. 17:44-2.2, the vendor shall maintain all documentation related to products, transactions or services under this contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

14. Energy Star energy efficient products: Under Executive Order #11 (Corzine), the College is required to select ENERGY STAR energy-efficient products when acquiring new energy-using products or replacing existing equipment. For products that do not have ENERGY STAR labels, vendors shall follow guidelines established by the New Jersey Clean Energy Program.

15. QUESTIONS

A. Direct inquiries and correspondence relating to this proposal form and questions regarding the technical specifications and requests for clarification must be submitted in writing via **email to kapura@tcnj.edu** and must be received **prior to 4:00 p.m., on March 21, 2022.**

B. Should any questions be received, a notice will be placed in the newspaper and the addendum or clarification will be available on **March 24, 2022 on the College's website at https://bids.tcnj.edu/. If an addendum and/or clarification is posted, it SHOULD be noted in the General Agreement section of the bidder's proposal. Failure to do so may subject Bidder to disqualification.**

16. HOW TO SUBMIT THE COMPLETED CONSTRUCTION BID PROPOSAL FORM

A. Bidder places all pages of the completed form and the requisite additional documents in an envelope, seals the envelope, and labels it with his/her firm name, address, and "Sealed Bid Enclosed for (**Bid Number and Project Name**)".

B. Bidder mails or deliver by hand the sealed bid, no later than **2:00 p.m., April 4, 2022**, to The College of New Jersey, Attention: Anup Kapur for (specify the Bid Number), Office of Finance & Business Services, Room 201, 2000 Pennington Road, Ewing, New Jersey 08628-0718. **At 2:00 p.m., all bids will be publicly opened and read in Room 203 of the Administrative Services Building.**

C. Contractors are advised that the U.S. Postal Service and all express mail companies deliver to The College's Mail Room or Receiving Department, not directly to the Office of Budget & Finance. The College is not responsible for lost or misdirected bids.

17. Any bid not prepared and submitted in accordance with the provisions described herein may be rejected by the College. Any bid received after the time and date specified will not be considered. No bidder shall withdraw a bid within sixty (60) days after the date of the bid opening. Contracts shall be awarded to the lowest responsible bidder whose bid, conforming to the invitation for bids, will be the most advantageous to the State college

18. Any bidder who has defaulted on any contract with the College or any other State Agency may be considered as not responsible and their bid may be rejected. THE COLLEGE OF NEW JERSEY reserves the right to exercise this option, as the College deems proper and/or necessary in accordance with applicable law.

19. Bids shall include all costs of any nature necessary to complete the project in the manner and within the time required by the contract.

20. The College reserves the right to require bidders to provide a schedule of values of their lump sum bid price upon request.

21. The College is exempt from all taxes including Federal Excise Tax, Transportation Taxes, State Excise, Sales Tax and local taxes. Rentals of equipment for 28 days or less is not exempt from any tax under the State sales tax act.

22. Before submitting his bid, the bidder shall be familiar with the Drawings, Specifications, and other Documents that will form part of the contract and shall have visited the site of the project to confirm for themselves the character and amount of work involved.

23. No bidder shall be allowed to offer more than one price on each item even though he/she may feel that he/she has two or more types or styles that will meet specifications. Bidders must determine for themselves which to offer. This may be cause for automatic rejection of bid.

24. It is understood and agreed that all prices quoted are firm and not subject to any increase during the life of the contract.

25. Should any difference arise between the contracting parties as to the meaning or intent of these instructions or specifications, the College's decision shall be final and conclusive.

26. Should the bidder discover discrepancies in this Request for Bids, the matter shall be at once brought to the attention of the College, and the discrepancies corrected by written agreement before submission of bid. The correction will be issued by addendum.

27. ACCEPTANCE/REJECTION OF BIDS

- **A.** THE COLLEGE OF NEW JERSEY, pursuant to State College Contract Law, Contracts shall be awarded to the lowest responsible bidder whose bid, conforming to the invitation for bids, will be the most advantageous to the State college.
- **B.** The bid is irrevocable by the bidder or the bidder's representatives. The bid, and any award made to the bidder by the College, shall bind the bidder and the bidder's heirs, executors, administrators, successors or assigns.
- **C.** Award of contract shall be made to the lowest responsible bidder, whose bid, conforming to the invitation for bids, is the most advantageous to the College.
- **D.** The award of the contract or the rejection of the bids shall be made within sixty (60) days of the date of receiving bids, unless written extensions are requested by the College and accepted by the bidder(s). All bid securities shall be returned immediately if all bids are rejected. The successful bidder(s) to whom the award is to be made will be notified by receipt of a written "Intent to Award" from the College.
- **E.** When award of contract is made in one fiscal year with effective date in the next fiscal year, award shall be contingent upon the availability and appropriation of sufficient funds for that purpose for the year in which said contract takes effect. When a contract shall be awarded for a period in excess of one year, said contract shall be contingent upon the annual availability and appropriation of sufficient funds for that purpose for each year of the contract term.

28. WITHDRAWAL OF BIDS

A. A written request for the withdrawal of a bid, or any part thereof, will be granted if the request is received by the College prior to the specified time of the bid opening.

B. Should the bidder refuse to perform the work for the price provided, they will forfeit their bid security and will be held liable for the difference between their low bid and the next highest/responsive bidder.

29. OSHA COMPLIANCE:

A. The Contractor shall guarantee that all materials, supplies and equipment to be provided under his contract shall meet all applicable requirements, Specifications and standards of the Federal Occupational Safety and Health Act (OSHA) of 1970 as amended to date of acceptance by the College, and shall also apply to Contractors Construction procedures.

30. APPLICABLE LAWS:

A. The following list of statutes and regulations, which may be applicable in whole or in part, is provided for the benefit of the Contractor and is not meant to be all-inclusive. In the event that other laws are applicable, it shall be the responsibility and obligation of the Contractor to ascertain and comply with them.

(1) New Jersey Statutes and Regulations

N.J.S.A. 10:5-31 *et seq.* and N.J.A.C. 17:27-1 *et seq.*, Affirmative Action
Prevailing Wage Act, N.J.S.A. 34:11-56.25 *et seq.*
N.J.S.A. 52:32-44, Business Registration Certificate
N.J.S.A. 34:11-56.48 *et seq.*, Public Works Contractor Registration Act

(2) Federal Statutes

Immigration Control and Reform Act (1986) – 8 U.S.C.A. Section 1324(a) *et seq.*
Civil Rights Act of 1964 – 42 U.S.C.A. Section 1971 *et seq.*
The Americans with Disabilities Act of 1990

31. EXAMINATION OF SITE, DRAWINGS AND SPECIFICATIONS

A. Each Bidder shall visit the site of the proposed work and fully acquaint themselves with the conditions as they exist so that they may fully understand the facilities, difficulties, and restrictions attending the execution of the work under this Contract.

B. Bidders shall also thoroughly examine and be familiar with the Drawings and Specifications. The failure to receive or examine any form, instrument or document, or to visit the site and acquaint himself with conditions there existing shall in no way relieve any bidder from obligation with respect to his bid. By submitting a bid, the bidder agrees and warrants that he has examined the site, the Drawings and Specifications and, that the Specifications and Drawings are

adequate and the required result can be produced under the Drawings and Specifications. No claim for any extra will be allowed because of alleged impossibilities in the productions of the results specified or because of unintentional errors or conflicts in the Drawings and Specifications. No change orders will be issued for items, materials or issues that existed on or with respect to the site prior to bidding.

32. DRAWINGS AND SPECIFICATIONS

A. The project shall be performed in accordance with the requirements of the Drawings and Specifications, subject to modification as provided in General Conditions. The Drawings and Specifications are intended to complement and supplement each other.

B. Any work required by either of them and not by the other shall be performed as if denoted in both. Should any work be required which is not also denoted in the Specifications or on the Drawings because of an obvious omission, but which is, nevertheless, necessary for the proper performance of the project, such work shall be performed as fully as if it were described and delineated.

33. FORM OF AGREEMENT

A. Every successful bidder shall be required to sign the standard form contract, a copy of which is attached. Any proposed language or form changes which in any way modifies the contractor's responsibilities as set forth in the Contract Documents will not be acceptable and will be deemed to constitute a bid exception.

34. MULTIPLE BIDS NOT ALLOWED:

A. No bidder is allowed to submit more than one bid from an individual, firm, partnership, corporation or association under the same or different name. This will be cause for automatic rejection of each bid.

35. SUBSTITUTIONS:

A. The bidder may include in their bid substitute materials or equipment or methods in lieu of those specified in the contract documents, but they do so at their own risk. Any substitution must be equivalent in type, function and quality to the item required in the contract. The successful bidder must submit all information required within 20 days of contract award to determine if the proposed substitute is equal to the contract requirements, and any substitution must be approved by the architect and the College.

B. The College shall have complete discretion to decide whether it will accept any substitution. No substitution shall result in any increase in the contract price or times. The successful bidder in its application for the substitution must certify in writing that the substitution is equal to what is specified in the contract documents in all material respects and will not increase the time or price of the contract work.

C. Should the substitution be rejected, the contractor will then be required to provide the specified product, material or method at no additional cost to the College and no change in the project schedule.

36. DOCUMENTS/SUBMISSIONS THAT MUST BE PROVIDED BEFORE CONTRACT AWARD:

- AFFIRMATIVE ACTION: The bidder is required to complete and submit a copy of Initial Project Workforce Report (AA-201) to the College and the Division of Public Contracts Equal Employment Opportunity Compliance verifying that the bidder is operating under a federally approved or sanctioned Affirmative Action program. The bidder also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to The College and the Division.

- CERTIFICATE OF INSURANCE: The bidder is required to submit proof of liability insurance in accordance with The College's contract.

- PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATES

- P.L. 2005, Chapter 51 / Executive Order 117 - Contractor Certification and Disclosure of Political Contributions:

  In order for your proposal to be accepted and deemed valid, your company/firm will be required to comply with the requirements of Chapter 51 and Executive Order 117. Enclosed are the requirements of Ch. 51 and EO 117, the forms for Certification and Disclosure. The contract that will be generated based on this bid cannot be awarded without approval of the Certification and Disclosure forms by the State of New Jersey, Department of Treasury.

- New Jersey Business Registration Certificate

- All applicable licenses, certificates, and requirements specified in the scope of work, contract documents and specifications.

The following Bidder's Checklist **is provided as an aid to the bidder. It does not in any way relieve the bidder of its responsibility to ensure that its bid proposal is complete.**

a. _____ Bidder has completed the Bidder Information section and General Agreement section and filled out the receipt of addendum and clarifications.

b. _____ Bidder has completed the form of proposal and indicated base bid for either Separate Bid or Single Bid (Lump Sum all trades), prices for Alternate Proposals, and Unit Prices.

c. _____ Bidder for Single Bid (Lump Sum) has listed and has disclosed the subcontractors on the Subcontractor Information form.

d. _____ Bidder has enclosed a certified check or bid bond for ten percent (10%) of the amount of the bid.

e. _____ Bidder has completed and enclosed the Non-Collusion Statement.

f. _____ Bidder and each disclosed subcontractor has enclosed a copy of its **registration certificate** in accordance with the requirement of the Public Works Contractor Registration Act. (NJ Dept. of Labor and Workforce Development). **A completed copy of your Certification form is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**

g. _____ Bidder has acknowledged the **Affirmative Action Language** in accordance with the requirements P.L. 1975 C.127. (NJAC 17:27-1.1 et seq).

h. _____Bidder has enclosed its MWBE information.

i. _____Bidder has enclosed its Electrical and Plumbing License and any other licenses, certifications, certifications, and qualifications.

j. _____Bidder has enclosed its Vendor Qualification Statement

~~**k.** _____ Bidder has included a copy of its latest Experience Modification Rating (EMR Safety Rating). The College requires an average rating over the last 5 years of 1.25 or less.~~

l. _____ Bidder has included a copy of its DPMC Notice of Classification and Total Amount of Uncompleted Contracts.

m. _____ Bidder has enclosed a copy of its Chapter 51 & EO117 Certification form. **A completed copy of your Certification form is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**

n. _____ Bidder has enclosed a copy of its New Jersey Business Registration Certificate in accordance with the requirements of the New Jersey Division of Revenue. **A completed copy of your Certificate is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**

o. _____ Bidder has completed and enclosed the Statement of Ownership Disclosure (N.J.S.A. 52:25-24.2).

p. _____ Disclosure of Investment Activities in Iran (N.J.S.A. 52:32-58).

GENERAL AGREEMENT

1. Having examined the plans and specifications with related documents and the site of the proposed work and being familiar with all of the conditions surrounding the construction of the proposed project including the availability of materials and labor, the undersigned hereby proposes to furnish all labor, materials, and supplies, and to construct the project in accordance with the Contract Documents, within the time set forth therein, and at the price stated. This price covers all expenses incurred in performing the work required under the Contract Documents, of which this proposal is a part.

2. Bidder acknowledges receipt of the following Addendums/Clarifications:

Addendum Number _____ Date _____Addendum Number ____ Date_____
Addendum Number _____ Date _____Addendum Number ____ Date_____
Addendum Number _____ Date _____Addendum Number ____ Date_____

3. Bidder acknowledges and affirms that he/she has personal knowledge of or has obtained and reviewed a copy of the valid prevailing wage rates at the time of the bid and for the duration of the contract for all trades involved in the project for the geographical location of the project as issued by the Commissioner of the Department of Labor & Workforce Development, Trenton, NJ 08625 (609) 292-2259 or visiting the Department of Labor website at (http//lwd.dol.state.nj.us/labor/wagehour/wagerate/wage_rates.html).

4. Bidder agrees that its price is good and the bid shall not be withdrawn for a period of 60 calendar days after the scheduled Bid Due Date and Time.

5. Upon conclusion of the 5 business day protest period, Bidder will execute the formal contract within 5 business days and deliver as required in the General Conditions: a Performance and Payment Bond; Surety Disclosure and Certification Statement; and certificates of insurance for general liability, automobile and worker's compensation.

6. Bidder acknowledges work to commence on site not later than ten (10) calendar days after receipt of a Notice to Proceed.

Respectfully submitted,

(Seal if bid is by Corporation)

_____
(Signature of Principal)

_____
(Printed Name of Principal)

_____
(Title of Principal)

PRICES FOR SINGLE BID (LUMP SUM): Base Bid, Alternate Proposals, and Unit Prices
FORM OF PROPOSAL

To: **The College of New Jersey**

for: Green Hall HVAC Upgrades

Date _____

A. BID:

1. **Base:** We, _____, the Undersigned, in accordance with the published advertisement inviting proposals, will furnish all labor, material, equipment and services necessary for the complete construction, as defined in the advertisement, specimen contract, specifications, addendums/clarifications/bulletins, drawings, and proposal, for the Contract amount indicated below for the **above noted project** in strict accordance with the Contract Documents and Addenda thereto for the total sum of:

_____Dollars $_____
(words)

General Construction (Single overall Prime Contract)

2. **Add /Deduct Alternate: None**

3. CHECK LIST FOR BIDDERS:
A check list has been provided in these specifications for the use in completing this proposal. Bidders are encouraged to reference said list to minimize the opportunity for errors by the bidder.

B. UNIT PRICES: None

C. AGREEMENT: We, the Undersigned, agree, if awarded the Contract, to execute an agreement for the above stated work and compensation on the Standard Form of Agreement Between Owner and Contractor.

D. SURETY: We, the Undersigned, agree, if awarded the Contract, to execute and deliver to the Owner, prior to the signing of the Contract, the Performance and Payment Bonds as required.

- Contractor shall provide a Maintenance Bond at job completion for a period of one year for 100% of the final contract price.

E. BID SECURITY: The attached bid security is to become the Property of the Owner in the event that the Contract and bond are not executed within the time set forth, as liquidated damages for the delay and additional expense (including the difference between the price provided with said bond and the next lowest responsive bidder) to the Owner caused thereby.

Certified Check $_____
Bid Bond $_____

F. STATEMENT:

1. We, the Undersigned, acting through its authorized officers and intending to be legally bound, agree that this bid proposal shall constitute an offer by the Undersigned to enter into a Contract with the acts and things therein provided, which offer shall be irrevocable for sixty (60) calendar days from the date of opening

hereof and that the Owner may accept this offer at any time during said period by notifying the Undersigned of the acceptance of said offer.

2. We, the Undersigned, acknowledge receipt of the following Addenda/Clarifications:

Addenda Number	Dated
_____	_____
_____	_____
_____	_____

The undersigned further agrees to comply with the requirements as to conditions of employment, wage rates, and hours of labor set forth in the Contract Documents.

Dated _____

Firm Name _____ Phone Number:_____

Address _____

_____

**If a corporation, give the State of Incorporation, using the phrase:
"A corporation organized under the laws of _____."
If a partnership, give names of the partners, using also the phrase:
"Co-partners trading and doing business under the firm name and style of
_____.
If an individual using a trade name, give individual name, also using the phrase:
"An individual doing business under the firm name and style of _____.

Dated: _____

STATE OF _____
SS.
COUNTY OF _____

_____ being duly sworn say that the several matters stated in this proposal are in all respects true, and that no member of the State or employee of the College are interested in any way in this proposal.

Sworn and subscribed before me _____
Bidder signs above line

this _____ day of_____ 20____

_____ _____ _____
Print Name and Title

SUBCONTRACTOR INFORMATION FOR SINGLE BID (LUMP SUM)

Pursuant to the State Colleges Contract Law, N.J.S.A. 18A:64-76.1, all bids submitted shall set forth the names and license numbers of all subcontractors to whom the bidder intends to subcontract the plumbing and gas fitting work; the refrigeration, the heating and ventilating systems and equipment; the electrical work, including any electrical power plants; tele-data, fire alarm, or security systems; the structural steel and ornamental iron work (individually, the "Trade" or collectively, the "Trades").

For each Trade listed below for which the work will be completed by a subcontractor you must list for each such subcontractor at a minimum the name and, where applicable, license number (or in lieu thereof enclose a copy of the license with this form) and preferably you will also list the subcontractor's address, telephone number, and fax number. If the work will be self-performed by the bidder, you may indicate that by inserting the name of the bidder (next to "Name"). If work by that Trade is not required per the scope of work of the project, you may indicate that by inserting "Not required" (next to "Name"). If the name of a subcontractor is not provided on this form for any one or more of the Trades, the bidder, in submitting its bid, certifies that, for such Trades, either the work will be self-performed by the bidder, or the work is not required per the scope of work.

Failure to complete this form as required may result in your bid being disqualified.

Plumbing and Gas Fitting Work

List information for Subcontractor, if any:

Name: _____

License Number: _____

Address: _____

_____

Telephone: _____

Fax: _____

Refrigeration, Heating and Ventilating Systems and Equipment

List information for Subcontractor, if any:

Name: _____

License Number: _____

Address: _____

_____

Telephone: _____

Fax: _____

Electrical Work, including any Electrical Power Plants, Tele-data, Fire Alarm, or Security Systems

List information for Subcontractor, if any:

Name: _____

License Number: _____

Address: _____

_____

Telephone: _____

Fax: _____

Structural Steel Work and Ornamental Iron Work

List information for Subcontractor, if any:

Name: _____

License Number: _____

Address: _____

_____

Telephone: _____

Fax: _____

_____
Bidder Name

By: _____
Signature

_____
Printed Name of Signing Individual

_____
Date

SMALL BUSINESS, MINORITY AND/OR FEMALE-OWNED BUSINESS REPORTING

1. Contractor and sub-contractors are requested to check all of the following that apply to their company and, if applicable, submit a copy of their certificate(s):

A. My company is certified by the NJ Department of Treasury, Division of Revenue as a:

_____ small business_____ minority-owned business _____female-owned business

B. My company is certified by the NJ Department of Transportation as a:

_____ small business_____ minority-owned business _____female-owned business

C. My company is a _____small business_____ minority-owned or _____ female-owned but is not certified by either NJ Department.

C. _____ My company is not a small business, minority-owned or female-owned.

_____

Signed

_____

Date

PERFORMANCE BOND & PAYMENT BOND

BOND NO._____

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____ _____as Principal, and_____, a corporation of the State of _____, duly authorized to do business in the State of New Jersey, having an office at _____, are hereby held and firmly bound unto The College of New Jersey in the Penal Sum of _____ DOLLARS, for payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

SIGNED this _____ day of _____, 20_____

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT, WHEREAS, the above named Principal did on the _____ day of _____, 20_____, enter into a written contract with The College of New Jersey for _____ which said contract is made a part of this bond as set forth herein;

NOW, if the said _____ shall well and faithfully do and perform the things agreed by _____ to be done and performed according to the terms of the said contract; shall pay all lawful claims of sub-contractors, materialmen, laborers, persons, forms of other suppliers or teams. fuel, oils, implements or machinery furnished, used or consumed in the carrying forward, performing, or completing of said contract, we agreeing and assenting that this undertaking shall be for the benefit of any subcontractor, materialman, laborer, person, firm or corporation having a just claim, as well as for the obligee herein; then this obligation shall be void, otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulated and agrees that no modifications, omissions, or additions in or to the terms of the said contract, or in or to the plans and specifications therefore shall in any wise effect the obligation of said surety on its bond.

This bond is given in compliance with the requirements of the statutes of the State of New Jersey including N.J.S.A. 18A:64-68 and any amendments thereof.

SIGNED, SEALED AND DELIVERED
IN THE PRESENCE OF

_____ BY:_____
Witness

_____ BY:_____
Witness as to Surety ATTORNEY-IN-FACT

Countersigned

NOTE: General Power of Attorney and the current

this _____ day of _____, 20_____

BY:_____

financial statement of the bonding company must be attached to each copy (a total of three) of the Performance Bond.

SURETY DISCLOSURE STATEMENT AND CERTIFICATION

_____, surety(ies) on the attached bond, hereby certifies(y) the following:

(1) The surety meets the applicable capital and surplus requirements of R.S. 17:17-6 or R.S. 17:17-7 as of the surety's most current annual filing with the New Jersey Department of Insurance.

(2) The capital (where applicable) and surplus, as determined in accordance with the applicable laws of the State of New Jersey, of the surety(ies) participating in the issuance of the attached bond is (are) in the following amount(s) as of the calendar year ending December 31, ____, (insert most recent calendar year for which capital and surplus amounts are available), which amounts have been certified as indicated by certified public accountants (indicating separately for each surety that surety's capital and surplus amounts, together with the name and address of the firm of certified public accountants that shall have certified those amounts):

_____

_____

_____

(3) (a) With respect to each surety participating in the issuance of the attached bond that has received from the United States Secretary of the Treasury a certificate of authority pursuant to 31 U.S.C. 9305, the underwriting limitation established therein and the date as of which that limitation was effective is as follows (indicating for each surety that surety's underwriting limitation and the effective date thereof):

_____

_____

_____

(b) With respect to each surety participating in the issuance of the attached bond that has not received such a certificate of authority from the United States Secretary of the Treasury, the underwriting limitation of that surety as established pursuant to R.S. 17:18-9 as of date on which such limitation was so established, is as follows (indicating for each such surety that surety's underwriting limitation and the date on which that limitation was established:

_____

_____

_____

(4) The amount of the bond to which this statement and certification is attached is $_____.

(5) If, by virtue of one or more contracts of reinsurance, the amount of the bond indicated under item (4) above exceeds the total underwriting limitation of all sureties on the bond as set forth in items (3) (a) or (3) (b) above, or both, then for each such contract of reinsurance:

(a) The name and address of each such re-insurer under that contract and the amount of that re-insurer's participation in the contract is as follows:

_____

_____

_____

(b) Each surety that is party to any such contract of reinsurance certifies that each reinsurer listed under item (5) (a) satisfies the credit for reinsurance requirement established under P.L. 1993, c. 243 (C. 17:51B-1 *et seq.*) and any applicable regulations in effect as of the date on which the bond to which this statement certification is attached shall have been filed with the appropriate public agency.

CERTIFICATION

(to be completed by an authorized certifying agent for each surety on the bond)

I, _____ (name of agent), as _____ (title of agent)

for _____ (name of surety),

a corporation/mutual insurance company/other (indicate type of business organization by circling one) domiciled in _____ _____ (state of domicile), DO HEREBY CERTIFY that, to the best of my knowledge, the foregoing statements made by me are true, and ACKNOWLEDGE that, if any of those statements are false, this bond is VOID and I am subject to punishment.

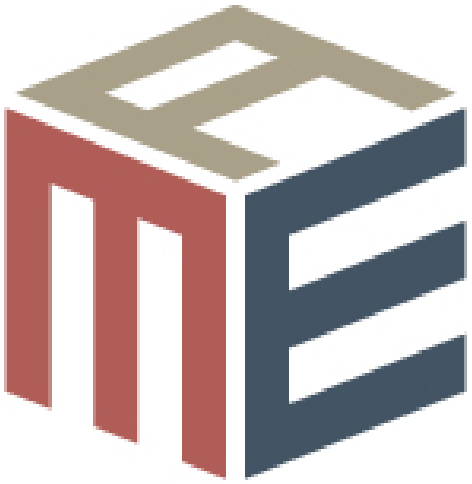
_____
(Signature of certifying agent)

_____
(Printed name of certifying agent)

_____
(Title of certifying agent)

_____
(Date of Certification)

McHugh Engineering Spec Binder



THE COLLEGE OF NEW JERSEY
GREEN HALL HVAC PROJECT
TCNJ PROJECT #GR221
ISSUED FOR BID: MARCH 3, 2022

CONTENTS

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the specifications, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of all work noted on the drawings and in these specifications
   1. Project Location: The College of New Jersey, Ewing New Jersey
   2. Owner: The College of New Jersey, State of New Jersey

1.03 CONTRACTS

A. The project contract is between The College of New Jersey and the single prime contractor performing the work specified.
B. Definition of Extent of Contract Work: The contract documents, specifications, project drawings, manufacturer's installation handbooks, TCNJ form of agreement, and the contractor's response to the RFP represent the extent of the construction contract.

1.04 CONTRACTORS USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The contractor's use of the premises is limited only by the Owner's right to perform work, retain other contractors on portions of associated projects, or to access the building for the occupants.
   1. Contractor is to coordinate their work with the activities for each work location.
B. Use of the Site: Limit use of the premises to areas required for equipment and material storage and access to the roof area. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas immediately adjacent to the building where the work is being performed.
   1. Owner Occupancy: Allow for Owner occupancy and use by the public.
   2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials unless previously approved by the owner. Schedule deliveries to minimize space and time requirements or storage of materials and equipment on -site.
   3. Burial of Waste Materials: Disposal of organic and hazardous materials on-site either by burial or burning, will not be permitted.
   4. Parking is allowed with in the construction fence only. If more parking is needed, there is additional parking provided at the colleges Carlton Avenue parking lot. The contractor is responsible to shuttle workers back and forth as needed
C. Use of the Existing Building: Maintain any existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all

precautions necessary to protect the building, its contents, components, and systems and its occupants during the construction period.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01025 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SCHEDULE OF VALUES

A. Each Contractor shall prepare a schedule of values in coordination with the preparation of progress schedule. Correlate line items with other administrative schedules and forms required for the work, including progress schedule, payment request form, listing of subcontractors, schedule of allowances if any, schedule of alternates if any, listing of products and principal suppliers and fabricators, and schedule of submittals. Break down principal subcontract amounts into multiple line items for each entity of work. Round off to nearest whole dollar, but with total equal to Contract Sum. Submit 4 copies of schedule of values to the Owner and architect for review and approval.
   1. Upon Owner/Architect approval, Owner will return the Schedule of Values to the Contractor for the Contractor to submit to the bonding company for their acceptance. Payments will not be made to the Contractor until the bonding company has provided a written acceptance to the Owner.

B. The schedule of values shall be tabulated into subcontracts and trades with the Quantity, Labor, Material, and Total Cost indicated. The Schedule of Values shall include such items as bonds, insurance, allowances, and alternates, punchlist/close out documents and shall enclose copies of invoices and/or cancelled checks from bonding and insurance agents.

C. Schedule of values shall be submitted on AIA Form G703 or similar form approved by the Architect and Owner.

D. Each Contractor's monthly application for payment shall be in the same schedule form, reflecting the same items from above. Unit costs shall be realistic for their part of the Work.

1.02 CHANGES IN THE WORK

A. When a change in the Work includes a category or categories of Work both added to and deducted from the Contract, the total quantities of added Work and of deleted Work shall be determined separately for each category and the appropriate unit price or net cost of the Work shall be applied to the difference between the two total quantities.

B. Unit prices shall be inclusive of all costs and shall be applied to units of measure as defined in the Specifications for each category of Work.

C. For all extra Work performed by the Contractor, the gross cost to the Owner shall include the net cost of the Work to the Contractor plus an allowance for overhead and profit not to exceed 15% of the net cost.

D. For all extra Work performed by a Subcontractor, the gross cost to the Owner shall include the net cost of the Work to the Subcontractor plus an allowance for overhead and profit not to exceed 15% of the net cost, plus the Prime Contractor's overhead and profit not to exceed 5% of the Subcontractor's cost.

E. Net cost of extra Work shall be the actual or pro-rated cost of:
   1. Labor, including foreman, at the prevailing rate of wages, contributions, and taxes.
   2. Materials entering permanently into the Work including delivery to the site.
   3. The ownership or rental cost of construction equipment and expendable tools, pro-rated for the time necessary for the Work.
   4. Power and consumable supplies for the operation of power equipment, pro-rated for the time

necessary for the Work.
5. Insurance and Bonds.

F. Gross costs shall be net costs plus the mark up allowances described above, such markup allowances being inclusive of all cost of superintendence, supervision, engineering, overhead, profit, administrative and site office expenses, and all other general expenses.

1.03 APPLICATIONS FOR PAYMENT

A. Except as otherwise indicated, sequence of progress payments for the Contractor shall be regular, and each shall be consistent with previous applications and payments. It is recognized that certain applications involve extra requirements, including initial applications, applications at times of substantial completion, and final payment applications.

B. Payment Application Forms: Use AIA Document G702 and G703 Continuation Sheets; available from Publications Distribution Div., The American Institute of Architects, 1735 New York Ave., N.W., Washington, D.C. 20006 (also available at most local AIA chapter offices).

C. Except as otherwise indicated, complete every entry provided on the form, including notarization and execution by authorized persons. Incomplete applications will be returned by Architect and Owner without action. Entries shall match current data of schedule of values, progress schedules and reports. Listing shall include amounts of fully executed change orders issued prior to first day of the period of construction covered by application. Applications for payment shall include weekly payroll report. Contractor shall furnish to the Owner certified payroll reports for each payroll period with pay request, indicating name craft, social security number and actual hourly rate of wages paid to each workman employed on the project. A certified payroll record is defined as "a payroll record which is attested to by the employer, or corporate officer of such company, or an authorized agent of the employer." A payment request will not be paid until the Owner receives the certified payrolls.

D. Submit one "pencil" copy of each proposed payment application to the architect and owner, for review, not less than seven days prior to formal submissions of application.

E. Submit 4 executed copies of each payment application. Transmit with a transmittal form listing attachment, and recording appropriate information related to application.

F. Breakdown may include a line item for General Conditions. General Conditions shall include the cost of general supervision, trailers, temporary utilities, and other general expenses directly related to the project and not considered overhead. The general conditions item shall be billed on monthly progress payments on a percentage of work completed.

1.04 INITIAL PAYMENT APPLICATION

A. The principal administrative actions and submittals which shall precede or coincide with submittal of the Contractor's first payment application can be summarized as follows, but not necessarily by way of limitation.
1. Listing of subcontractors and principal suppliers and fabricators.
2. Schedule of values.
3. Schedule of principal products.
4. Schedule of submittals (preliminary if not final).
5. Copies of acquired building permits and similar authorizations and licenses from governing authorities for current performance of the work.
6. Data needed by Owner to secure related insurance coverages.
7. Performance and Payment Bond.
8. Insurance Certificates.

1.05 PROGRESS PAYMENTS

A. Based upon application for payments submitted to the Architect and the Owner, by the Contractor, on or about the 25th day of each month for the period ending the last day of the previous second month, and Certificate of Payment issued by the Architect and the Owner, the Owner will make progress payments on account of the Contract Sum to the Contractor as follows:

1. On or after the 20th day of each month, the Contractor shall submit to the Architect and Owner a "pencil copy" indicating the previous payment and the proposed amounts for each line item for the current period. After review and approval or changes, the Contractor shall prepare the final billing for presentation to the Architect and Owner.
2. Whenever any contract, the total price of which exceeds $100,000, entered into by a State college, for the construction, reconstruction, alteration or repair of any building, structure, facility or other improvement to real property, requires the withholding of payment of a percentage of the amount of the contract, the contractor may agree to the withholding of payments in the manner prescribed in the contract, or may deposit with the State college registered book bonds, entry municipal bonds, State bonds or other appropriate bonds of the State of New Jersey, or negotiable bearer bonds or notes of any political subdivision of the State, the value of which is equal to the amount necessary to satisfy the amount that otherwise would be withheld pursuant to the terms of the contract. The nature and amount of the bonds or notes to be deposited shall be subject to approval by the State college. For purposes of this section, "value" shall mean par value or current market value, whichever is lower.
    a. If the contractor agrees to the withholding of payments, the amount withheld shall be deposited, with a banking institution or savings and loan association insured by an agency of the Federal government, in an account bearing interest at the rate currently paid by such institutions or associations on time or savings deposits. The amount withheld, or the bonds or notes deposited, and any interest accruing on such bonds or notes, shall be returned to the contractor upon fulfillment of the terms of the contract relating to such withholding. Any interest accruing on cash payments withheld shall be credited to the State college.
    b. Any contract, the total price of which exceeds $100,000, entered into by a State college involving the construction, reconstruction, alteration, repair or maintenance of any building, structure, facility or other improvement to real property, shall provide for partial payments to be made at least once each month as the work progresses, unless the contractor shall agree to deposit bonds with the State college pursuant to section 1.
    c. With respect to any contract entered into by a State college pursuant to section 2 for which the contractor shall agree to the withholding of payments pursuant to section 1, 2% of the amount due on each partial payment shall be withheld by the State college pending completion of the contract.
    d. Upon acceptance of the work performed pursuant to the contract for which the contractor has agreed to the withholding of payments pursuant to subsection a. of this section, all amounts being withheld by the State college shall be released and paid in full to the contractor within 45 days of the final acceptance date agreed upon by the contractor and the State college, without further withholding of any amounts for any purpose whatsoever, provided that the contract has been completed as indicated. If the State college requires maintenance security after acceptance of the work performed pursuant to the contract, such security shall be obtained in the form of a maintenance bond. The maintenance bond shall be no longer than two years and shall be no more than 100% of the project costs.
    e. This act shall take effect immediately. This bill supplements the “State College

Contracts Law," P.L.1986, c.43 (C.18A:64-52 et seq.), and applies to any State college contract for over $100,000 which involves the construction, reconstruction, alteration or repair of any building, structure, facility, or other improvement to real property. Under the provisions of this bill, whenever a contract of this type requires the withholding of payment of a percentage of the amount of the contract, the contractor would have the choice of either agreeing to a retainage deduction from each monthly progress payment, or the contractor could choose to deposit bonds in the amount necessary to satisfy the amount that otherwise would be withheld under the contract. If a contractor chooses a retainage deduction from each monthly payment, then the retainage would be limited to 2% of the amount due on each partial payment. Upon acceptance of the work performed pursuant to the contract for which the contractor has agreed to a retainage deduction, all amounts being withheld by the State college must be paid in full to the contractor within 45 days of the final acceptance date agreed upon by the contractor and the State college. The bill provides that if the State college requires maintenance security after acceptance of the work performed under the contract, the security must be obtained in the form of a maintenance bond, which is required to be no longer than two years and no more than 100% of the project costs. The provisions of this bill are similar to provisions in the "Local Public Contracts Law," P.L.1971, c.198 (C.40A:11-1 et seq.) and the "Public School Contracts Law," P.L.1977, c.114 (C.18A:18A-1 47 et seq.).

3. Upon substantial completion, the retainage shall, upon the Architect/Owner's approval, remain at 2% of the value of work completed. Final release of retained monies will occur only upon the total completion of all punch list and closeout documentation to the satisfaction of the Architect and Owner.
4. For each day's delay in the Contractor's submission of an application for payment acceptable to the Architect and Owner, the Owner may delay one day in making his progress payment.
5. Owner shall make payments within 30 days of receipt of said monthly pay requisition.

1.06 APPLICATION AT TIME OF SUBSTANTIAL COMPLETION

A. Following issuance of certificate of substantial completion on each Contractor's work, and also in part as applicable to prior certificates on portions of completed work as designated, a "special" payment application may be prepared and submitted by Contractor. The principal administrative actions and submittals which shall precede or coincide with such special applications can be summarized as follows, but not necessarily by way of limitation:
   1. Occupancy permits and similar approvals or certifications by governing authorities and franchised services, assuring Owner's full access and use of completed work.
   2. Warranties, guarantees, maintenance agreements and similar provisions of Contract Documents.
   3. Test/adjust/balance records, maintenance instructions, meter readings, startup performance reports, and similar change over information germane to Owner's occupancy, use, operation, and maintenance of completed work.
   4. Final cleaning of the work.
   5. Application for reduction (if any) of retainage, with consent of surety.
   6. Advice to Owner on coordination of shifting insurance coverages, including proof of extended coverage as required.
   7. Listing of Contractor's incomplete work, recognized as exceptions to certificate of substantial completion.

1.07 FINAL PAYMENT APPLICATION

A. The administrative actions and submittals which shall precede or coincide with submittal of the Contractor's final payment application can be summarized as follows, but not necessarily by way of limitation.
   1. Completion of project closeout requirements.
   2. Completion of items specified for completion beyond time of substantial completion, regardless of whether special payment application was previously made.
   3. Assurance, satisfactory to Owner and Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
   4. Transmittal of required project construction records to Owner via the Owner.
   5. Proof, satisfactory to Owner and Owner, that taxes, fees, and similar obligations of Contractor have been paid.
   6. Removal of temporary facilities, services, surplus materials, rubbish, and similar elements.
   7. Notarized consent of surety for final payment.

1.08 WAIVER OF LIENS

A. Each Contractor, for himself, and for all Subcontractors and material men, agrees that no mechanic's lien or other claim shall be filed or maintained by the contractor or by any Subcontractor, materialmen, laborer, or any other person whatsoever for, or on account of any work performed or materials furnished under this Contract. This agreement shall be an independent contract, and the contractor shall execute and deliver a separate Waiver of Liens in form and substance satisfactory to the Architect and Owner contemporaneously with the execution of the Owner-Contractor Agreement and before any work is begun at the site.

B. In every subcontract entered into by each Contractor after execution of this Contract or in connection herewith, the Contractor shall incorporate a provision, similar to the foregoing paragraph, to the effect that neither the Subcontractor nor any party acting through or under him shall file or maintain any mechanic's lien or other claim against the Architect or Owner in connection with the Work.

END OF SECTION

SECTION 01100 - PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SPECIAL REQUIREMENTS

A. Schedule: Contractor shall provide a master schedule showing sequencing of work utilizing the CPM method. The Contractor shall supply a schedule with all subcontractor activities, relationships, and durations, utilizing the CPM method via SureTrak/Primavera, Version 3.0, or a Microsoft scheduling software to the Owner on a working version CDrom and coordinate their schedule with the Owner.
   1. The Contractor is required to update at the end of each month the CPM Schedule based on the percentage completed for each activity on the approved schedule (in concert with the submission of the percentage completed in the monthly proposed schedule of values).
   2. The contractor in their bid includes a cost of $500.00 per month for this schedule submission, for the duration of construction (per the milestone schedule in the bidding documents). This only applies to projects in excess of 2 million dollars in base price. The contractors schedule of values shall include this cost, and can only be billed for upon TCNJ's successful receipt of said schedule. Should any schedule not be received at the end of any month during construction, TCNJ will issue a deduct change order in the amount of $500.00 to the contractor.

B. Each Contractor shall take all necessary precautions to ensure the safety of all structural elements during all phases of all work. No materials, cranes, trucks, or any other construction loads shall be placed on any part of the structure until the Contractor has determined the adequacy of that structure to carry the intended load without damage or overstress.

C. Entrance into, or other use of the building will not be permitted except as may be necessary for the execution of the Work, and shall be subject to the restrictions and instructions of the Owner.

D. Routes of ingress and egress to areas where work is being performed shall be subject to the restrictions and instructions of the Owner.

E. Materials shall be moved through the building using rubber tired vehicles which shall be properly controlled at all times to avoid damage to existing wall, floor or ceiling surfaces.

F. Water damage cannot be tolerated and it is incumbent upon Contractors to take any steps necessary to keep the existing premises dry at all times.

G. Any damage to the new building from heavy equipment, striking the building or any other damage to any part of the premises shall be repaired at the expense of the Contractors.

H. All welding and cutting shall be performed by qualified and certified welders. Certificates shall be on file with the Contractor prior to commencement of any welding.

I. No work shall start before 8:30am. unless agreed to in advance with the College.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL

A. Contractors shall perform the work on or about the premises in a careful manner with full consideration to fire protection as required by the National Fire Protection Association Standards, National Board of Fire Underwriters and State and Local Departments having jurisdiction. Fire resistant materials shall be used for temporary enclosures.

B. Chemical extinguishers approved by the Owner shall be provided by the General Contractor during the progress of the work where and as required by the Owner, the State Fire Marshal, and the National Board of Fire Underwriters.

C. The Contractor shall maintain an active program of fire prevention to keep workmen fire conscious during the entire life of the Contract. Designate one member of the organization to execute and coordinate fire control measures of his own organization and that of all subcontractors under his jurisdiction.

D. All sub-contractors shall cooperate with the Contractor in carrying out the above program.

E. Storage of flammable materials will not be permitted in the building unless written permission is obtained from the Owner. Storage of all such materials shall be the Contractors' responsibility.

F. On-site open burning of rubbish, garbage, trade waste, leaves or plant life is prohibited.

G. Safety Program: The Contractor shall institute a safety program in accordance with OSHA and any local, state, or federal guidelines. The contractor shall name a safety officer to monitor this program and shall submit a safety report at job meetings.

H. Stockpiling: Stockpiling of materials on site will be allowed (but limited due to the limited space on this site). Such materials shall not impair or impede the functioning of the facility. Materials stored on site shall be secured to prevent loss from theft, damage, vandalism, or fire. By stockpiling materials on site, the contractor assumes full responsibility for said materials, and shall protect them to the fullest extent possible. Specific locations for stockpiling materials shall be coordinated with the Architect, and Owner.

I. Safety Barriers: The Contractor shall erect safety barriers to deter and prohibit unauthorized access to the construction site; such barriers may take the form of fences and shall be clearly marked with signage prohibiting unauthorized access. The Contractor shall be responsible for safety barriers within the building. The contractor shall be liable for damages to persons or property due to the construction process if adequate safety measures are not undertaken. The Owner and Architect shall review safety precautions for their adequacy but shall not be held liable for Contractor’s failure to maintain or provide adequate protection.

J. Sequencing: The Contractor will work with the Sub-Contractors to sequence the work during the submission of monthly project schedules. Contractors shall endeavor to coordinate their work efforts with the Owner's requirements. Interruptions of utility services shall be coordinated with the Architect, and Owner, but in no instance shall last longer than 2 hours.

K. Limited staging and onsite parking will be provided by General Contractor. The Contractor will coordinate parking areas with all the subcontractors and TCNJ.
   1. Parking will be available at Carlton Avenue. Contractor will provide shuttle service to and from the site.
   2. Contractor will be permitted to have vehicles on site within the construction fencing only. Contractor is to provide stone in all parking areas on site to prevent the buildup of ruts and mud, thus minimizing the amount of mud leaving the site and being left behind on TCNJ roads.

L. Site Utilities: Electric power and water are available on site. Toilet facilities will be made available by the Contractor. These facilities shall remain clean by the Contractors throughout the course of the project. The Contractors shall repair and/or replace any damaged fixtures, partitions, etc. The Electrical Sub-Contractor shall tie in a temporary power panel (or panels as required) for all trades to

use during construction. Interruption of building services shall not occur without prior consent and coordination by the Owner and Owner.

1. Provide portable toilets for all construction personnel.

M. Construction Lighting: The Electrical Sub-Contractor shall run sufficient strings and fixtures to maintain a 50 foot-candle/sq. ft. intensity of light throughout the project areas.

N. Dumpster Location and Cleanup: The Architect and Owner shall coordinate the dumpster location with the Contractors. The Contractor shall be responsible for obtaining, maintaining, and disposing of dumpsters, and shall maintain clean work areas throughout the course of the project.

1. Contractor is to provide adequate manpower during the entire course of the project to maintain the site in a clean, neat, and professional manner. At a minimum the contractor is to clean the entire site twice per week (on different days) by picking up all debris in and around the site. Sweeping the entire building daily is required once the floor slabs are in place. Contractor is to place garbage cans on each floor minimum 3 per floor in designated locations to assist in keeping the site clean. The owner will not tolerate a building project that is not maintained in a professional manner at all times.

3.02 PROGRESS MEETINGS

A. Progress Meetings shall be held bi-weekly at the job site at a regular time and day mutually agreed upon. The frequency may be changed by the Architect or Owner to reflect current conditions. The Contractors, those of his/their subcontractors concerned with current progress or with scheduling of future progress, the Architect, the Owner, and the Owner shall each be represented at these job meetings by persons familiar with the details of the work and authorized to conclude matters relative to work progress, establishment of progress schedules, etc., as may be necessary to expedite completion of the work.

B. The Contractors and his/their subcontractors attending these meetings shall present complete and definite reports as to the status of their respective work, conditions of product and equipment manufacturer, labor availability, productivity and cooperation, shipping data, time of completion, sequence of the work, safety program, and any other information bearing upon the execution of the Contract or subcontract. For the Owner's convenience the Owner will chair the meetings.

3.03 MONTHLY REPORTS

A. The Contractor is to provide TCNJ a brief monthly status report on the last working day of each month dividing the status of the project into the following categories (report must be complete in all respects, piece meal submissions will not be accepted):

1. Project overview
2. Financial status
3. Updated project schedule
4. Change order request log
5. Submittal log
6. RFI log
7. Owner/Architect issues that need immediate resolution
8. Order/delivery issues

B. The Contractor is to provide TCNJ with this monthly report, and include in their bid a cost of $500.00 per month for all projects in excess of 2 million dollars base bid price for the duration of the construction period as noted in the bidding milestone schedule. This total cost will be listed in the contractor’s schedule of values and can be billed for on a monthly basis only if said report is received in whole as noted above. Should TCNJ not receive said complete report a deduct change order will be issued to the contractor for $500.00 for that month.

END OF SECTION

SECTION 01300 – SUBMITTALS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 PROGRESS SCHEDULE / COORDINATION DRAWINGS

A. The Contractor's schedule shall coordinate with all trades to produce a coordinated CPM via Suretrak/Primavera version 3.0 or a Microsoft scheduling program schedule indicating the start and completion dates for each portion of the work as defined by the schedule of values, with the total time as defined by the contract time and milestone dates as set forth in these specifications. The Contractor's CPM schedule shall be submitted in electronic format (Suretrak 3.0 or a Microsoft Scheduling program) to and reviewed by the Owner and Architect prior to first application for payment. Any revisions or additional information requested by the Owner or Architect shall be provided. (No payment shall be made to any Contractor not providing a schedule that reflects their entire work).
   1. Also refer to Section 01100-1 – Project Procedures.

B. The Contractor shall revise the progress schedule on a monthly basis as the work progresses reflecting therein any delays, including those not within the Contractor's control, or accelerations in the progress of the work. The progress schedule, as revised for any weekly period, shall be discussed at the bi-weekly job meetings with the Owner, the Architect, and the Contractor and the major trades in order to insure that the percentage of actual completion of any portion of the work as called for in the progress schedule for that bi-weekly period is attained. Monthly updates to the progress schedule shall be made prior to application for payment.

C. Should any delay occur in the progress of the work or any portion thereof, the Contractor shall be required to implement all necessary measures to accelerate the construction, to meet the percentages of completion dictated by the progress schedule on the applicable dates, without additional cost to the Owner.

1.02 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop drawings, product data and samples will not be processed by the Owner and/or Architect until the list of subcontractors, material suppliers and fabricators is submitted as required under Paragraph 3.12 of the General Conditions.
   1. The successful Contractor shall submit their list of proposed substitutions within 20 calendar days of the Contract Award.
   2. The Architect shall be compensated on an hourly basis for review of all shop drawings or samples that do not meet the requirements of the contract documents after two submissions. The compensation shall be deducted from the contractor's contract via a deduct change order, or other means that both parties agree to.

B. Coordinate preparation and processing of submittals with performance of the work so that work will not be delayed by submittals. Allow two weeks for review/approval by the Architect for the approval process, one additional week for TCNJ staff to review the submittal before it is returned to the contractor. Allow additional time if processing must be delayed to permit coordination with subsequent submittals with others.
   1. Contractor is to provide a submittal schedule identifying the critical path submittals to assist the design team in prioritizing their review and subsequent return to the contractor prior to the first requisition for payment being processed. Every submittal is to have a required return

date associated with it so the design team can schedule their reviews accordingly.

C. Provide permanent marking on each submittal to identify Project, date, Contractor, subcontractor, submittal name, Specification section, drawing reference, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space (5" x 7") for Architect's Action marking and space for Owner's review marking. Package each submittal appropriately for transmittal and handling. Submittals received, which are lacking the above information, will be returned without action. Submittals, which are received from sources other than through Contractor's office, will be returned without action.

D. Each submission shall be complete, with all options clearly marked and with all components required for the assembly fully described and detailed. Submissions missing important information will be returned unchecked.

E. Transmittal Form: Submittals shall be accompanied by a transmittal form. Provide Contractor's certification on form, ready for execution, stating that information submitted complies with requirements of contract documents.
   1. Transmit all submittals and shop drawings to the Architect or Engineer with a copy of the transmittal to the Owner.

F. Except as otherwise indicated in individual work sections, comply with requirements specified herein for each indicated category of submittal. Provide and process intermediate submittals, where required between initial and final, similar to initial submittals.

G. Maintain returned final set of samples at project site, in suitable condition and available for quality control comparisons by Architect, and by Owner.

H. Do not proceed with installation of materials, products, or systems until final copy of applicable shop drawings, product data and samples are in possession of Installer.

I. Provide newly prepared shop drawings, on reproducible sheets, with graphic information at accurate scale, with company name of preparer indicated. Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards, and special coordination requirements. Do not allow shop drawing copies without appropriate final Action markings by Architect to be used in connection with the work.
   1. Initial and Intermediate Submittals: One correctable translucent reproducible print and 5 blue line or black line prints; reproducible will be returned.
   2. Final Submittal: 6 prints, plus 3 additional prints where required for maintenance manuals; 4 will be retained and remainder will be returned, one of which shall be marked up and maintained by Contractor as "Record Document".
   3. Electronic submittals are acceptable in AutoCad format only. Contractor shall be responsible for printing and distribution of multiple copies as required.

J. Collect required product data into one submittal for each unit of work or system; and mark each copy to show which choices and options are applicable to the project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements that have been checked, and special coordination requirements. Maintain one set of product data for each submittal at project site, available for reference by Architect and others.

K. Submittals will be accepted from the Contractor only. Submittals received from other entities will be returned without review or action.
   1. Submittals received without a transmittal form will be returned without review or action.
   2. Transmittal form: Use a form matching the sample form attached to this section. Include the following:
      a. List of deviations.
      b. The Contractor's certification signature.
   3. Fill out a separate transmittal form for each submittal; also include the following:

a. Other relevant information.
b. Request for additional information.

L. Do not submit product data, or allow its use on the project, until compliance with requirements of Contract Documents has been confirmed by Contractor. Submittal is for information and record unless otherwise indicated. Initial submittal is final submittal unless returned promptly by Architect marked with an Action that indicates and observed noncompliance. Submit 6 copies, plus 3 additional copies, which will be returned, where required for maintenance manuals.
1. Electronic submittals are acceptable in 8 ½" x 11" format only.

M. Provide three (3) samples identical with final condition of proposed materials or products for the work. Include range samples, not less than 3 units, where unavoidable variations between units of each set. Provide full set of optional samples where Architect's selection is required. Prepare samples to match Architect's sample where so indicated. Include information with sample to show generic description, source or products name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture, and kind by Architect. Architect will not test samples, except as otherwise indicated, for compliance with other requirements, which are therefore the exclusive responsibility of the Contractor.

N. Upon receipt of a signed copy of the Architects' Waiver form, electronic copies of CAD drawings of the Contract Documents will be provided by the Architect for Contractor's use in preparing submittals. Copy of Waiver form is attached.

O. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the named product or an equivalent.
2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product of the manufacturer or source that complies with requirements, or an equivalent.
3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements, or an equivalent. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.
4. Manufacturers: Where specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed, or an equivalent, that complies with requirements. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.
5. Product Options: Where Specification paragraphs or subparagraphs refer to "Product Options and Substitutions," indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system; provide the specific product or system or an equivalent product or system by another manufacturer. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.
6. Basis of Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" introduce or refer to a list of manufacturers' names, provide either the specified product or an equivalent. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product names. Comply with the provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.

1.03 MISCELLANEOUS SUBMITTALS

A. Miscellaneous submittals related directly to the work include warranties, maintenance agreements, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices, and materials applicable to the work and not processed as shop drawings, product data or samples.

B. Refer to sections for specific general requirements on warranties, product/workmanship bonds, and maintenance agreements. In addition to copies desired for Contractor's use, furnish 2 executed copies, except furnish 3 additional copies where required for maintenance manuals.

C. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

1.04 PRODUCT OPTIONS AND SUBSTITUTIONS

A. DEFINITIONS

1. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
    a. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
    b. New Products: Items that have not previously been incorporated into another project or facility, except those products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
    c. Equivalent Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
2. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
3. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
4. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
5. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
6. Buy American Requirement: The Contractor shall comply with N.J.S.A 52:32-1 and N.J.S.A. 52:33-1 et seq., which prohibits the use by the Contractor or subcontractors of materials or farm products produced and manufactured outside of the United States on any public work.

B. General Requirements:

1. The requirements for substitutions do not apply to specified Contractor options on products and construction methods. Revisions to Contract Documents, where requested by Owner or

Architect are changes, not substitutions. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute substitutions and do not constitute a basis for change orders. Otherwise, Contractor's requests for changes in products, materials, and methods of construction required by Contract Documents are considered requests for substitutions, and are subject to requirements hereto.

2. To the greatest extent possible, provide products, materials, and equipment of a singular generic kind
and from a single source.
3. Where more than one choice is available as options for Contractor's selection of a product or material, select an option that is compatible with other products and materials already selected. Total compatibility among options is not assured by limitations within Contract Documents, but shall be provided by Contractor. Compatibility is a basic general requirement of product/material selections.
4. Any and all contractor substitutions that require additional work by other trades not specifically called for in the documents shall be paid for by the contractor requesting the substitution if any other trade increase is required.
5. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

C. Submittals: Submit 6 copies, utilizing Substitution Request Form, CSI Form 13.1.A, fully identified for product or method being requested for substitution, including related specification section, and drawing numbers, and fully documented to show compliance with requirements for substitutions. Include product data/drawings, description of methods, samples where applicable, Contractor's details comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work and contractors, cost information or proposal, warranty information, compatibility with other work, approval of all authorities having jurisdiction, and Contractor's statement to the effect that proposed substitution will result in overall work equal to or better than work originally indicated.

D. Contractor's options for selecting products are limited by Contract Documents requirements, and governing regulations. Required procedures include, but are not necessarily limited to, the following for various indicated methods or specifying:

1. Single product/manufacturer name; provide product indicated or equivalent, except advice Architect before proceeding, where known that named product is not a feasible or acceptable selection.
2. Two or more product/manufacturer names; provide one of the named products or equivalent, at Contractor's option; but excluding products which do not comply with requirements. Advise Architect before proceeding.
3. Equivalent: where named products in Specification’s text are accompanied by the term “or equivalent", or other language of similar effect, comply with those Contract Documents provisions concerning substitutions for obtaining Architect's approval of equivalent product.
4. Named, except as otherwise indicated, is defined to mean manufacturer's name for product, as recorded in published product literature, of latest issue as of date of Contract Documents. Refer requests to use products of a later or earlier model to Architect for acceptance before proceeding.
5. Where compliance with an imposed standard, code or regulation is required, selection from among products that comply with requirements including those standards, codes, and regulations, is Contractor's option.

6. Provide products which comply with specific performances indicated, and which are recommended by manufacturer, in published product literature or by individual certification, for application indicated. Overall performance of a product is implied where product is specified for specific performance.
7. Provide products that have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for mixing, fabricating, curing, finishing, testing and similar operations in manufacturing process.
8. Where matching of an established sample is required, final judgment of whether a product proposed by Contractor matches sample satisfactorily is Architect's judgment. Where no product within specified cost category is available, which matches sample satisfactorily and complies with requirements, comply with Contract Document provisions concerning substitutions for selection of a matching product outside established cost category or not complying with requirements.
9. Where specified product requirements include "...as selected from manufacturer's full range of colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic product data is to comply with requirements of the Contract, and selection shall be from the full range of products within the requirements. Where specified product requirements include "... as the industry...", or words to that effect, selection of product complying with requirements, is Architect's selection, including designation of manufacturer, where necessary to obtain desired color, pattern, or texture.

E. Substitutions may be permitted by the Architect, if, in his opinion, the requirements of the proposed substitution comply with the requirements specified for the material, article or piece of equipment; however, the Architect is not required to permit substitution pursuant to the case of Whitten Corporation vs. Paddock, Incorporated, United States District Court, Massachusetts, April 12, 1974, affirmed by the Federal First Circuit Court, December 14, 1974.

F. After award of contract, the Contractor may submit substitutes to the Architect for review, fully documented and certified, and accompanied by a proposal for a reduction in the Contract Sum.

G. Contractor's request for substitution will be received and considered when extensive revisions to Contract Documents are not required and changes are in keeping with general intent of Contract Documents; when timely, fully documented and properly submitted; and when one or more of following conditions is satisfied, all as judged by Architect. Otherwise, requests will be returned without action except to record noncompliance with these requirements.
   1. Where request is directly related to an "equivalent" clause or other language of same effect in Contract Documents.
   2. Where required product, material or method cannot be provided within Contract Time, but not as a result of Contractor's failure to pursue the work promptly or coordinate various activities properly.
   3. Where required product, material or method cannot be provided in a manner which is compatible with other materials of the work, or cannot be properly coordinated therewith, or cannot be warranted (guaranteed) as required, or cannot be used without adversely affecting Owner's insurance coverage on completed work, or will encounter other substantial noncompliance's which are not possible to otherwise overcome except by making requested substitution, which Contractor thereby certifies to overcome such incompatibility, uncoordination, nonwarranty, noninsurability or other noncompliance as claimed.
   4. Where substantial advantage is offered Owner, in terms of cost, time or other valuable considerations, after deducting offsetting responsibilities Owner may be required to bear, including additional compensation to Architect for redesign and evaluation services, increased cost of other work by Owner or separate Contractors, and similar considerations.

H. Contractor's submittal of, and Architect's acceptance of, shop drawings, product data or samples which indicate work not complying with requirements of Contract Documents, does not constitute an

acceptable and valid request for, nor approval of, a substitution.

I. QUALITY ASSURANCE

Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

J. EQUIVALENT PRODUCTS

Where products or manufacturers are specified by name, Contractor must submit the following, in addition to other required submittals, to obtain approval of an unnamed product proposed as an equivalent:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

1.05 OPERATION AND MAINTENANCE INSTRUCTIONS AND EQUIPMENT WARRANTIES

A. The Contractor shall orient and instruct the responsible maintenance personnel designated by the Owner in the Operation of all equipment and shall provide the maintenance personnel with pertinent literature and operational manuals for all equipment. Date and time of demonstrations shall be mutually agreed upon with the Owner. Provide qualified personnel for as long as necessary to fully orient and instruct the Owner. Contractor shall videotape instruction session and provide owner with completed video.

B. The manuals shall be submitted in (quadruplicate) 3-ring loose-leaf type binders and electronically in PDF format and be able to be TEXT SEARCHABLE to the Architect for approval with all additional information that the Architect may request and considers necessary for the proper servicing and maintenance of all equipment. Manuals are to include plain paper copies of approved shop drawings and catalog cuts. The quality of the copies may be subject to approval by the Architect. Upon completion and approval, 3 copies will be forwarded to the Owner and one copy retained by the Architect.

C. Manuals shall include no less than the following:

1. Operating Procedures:
   a. Typewritten procedures indicating each mode of operation of each piece of equipment or system. Procedures shall indicate the status of each component of a system in each operating mode.
   b. Procedures shall indicate names, symbol numbers, valve tags, circuit numbers, schematic control and wiring diagrams, locations of thermostats, manual starters, control cabinets, and other controls of each system.
   c. Emergency shutdown procedures for each piece of equipment or system, both automatic and manual as appropriate.

2. Maintenance Schedule: Typewritten schedule describing manufacturer's recommended schedule of maintenance and maintenance procedures.
3. Catalog cuts and shop drawings:
   a. Catalog cuts shall clearly indicate the exact model and type of each piece of equipment installed in the Project, including all options provided.
   b. Catalog cuts shall fully describe equipment including physical, electrical, mechanical, and other characteristics, performance characteristics and installation or erection diagrams.
   c. Catalog cuts shall indicate spare part numbers and name, address and telephone number of local representative or service department.
4. Typewritten list of all subcontractors on the Project including name, address, telephone number and responsibility on the Project.
5. Manuals shall be indexed with dividers indicating each system or piece of equipment.
6. Warranties, permits, inspection stickers/approvals and Certificate of Occupancy are to be included.

D. Required equipment warranties shall be submitted in three copies and electronically in PDF format to the Architect.

E. The Contractor shall video tape all instructional sessions and demonstrations and provide the Owner with a copy of the videotape at the end of all demonstrations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 ACTION ON SUBMITTALS

A. One copy of all submissions will be returned to the Contractor for his files. The Contractor shall markup other copies so as to conform with the copy returned to him and forward them to all interested Contractors, Subcontractors, and Suppliers.

B. The Architect will review and stamp submitted shop drawings in one of the following ways (the actual stamp may be different; below language is shown for an example only)
   1. "No Exceptions Taken": Approved.
   2. "Make Corrections Noted": Approved, provided the work complies with corrections marked on the submittal.
   3. "Revise and Resubmit": Do not commence work of this submittal. Revise and resubmit or prepare a new submittal; comply with notations marked on submittal.
   4. "Rejected": Fundamentally not in compliance. Prepare a new submittal. No notations or comments made.

C. Work shall be executed in accordance with "Approved", "Approved As Noted", or "Resubmit for Record" stamp only.

D. Architect's review of shop drawings/submittals will constitute checking for general arrangement only, and shall not relieve the Contractor of responsibility for complete compliance with Drawings and Specifications. Contractor shall be responsible for quantities and dimensions to assure a proper fit under field conditions.

3.02 DISTRIBUTION

A. Provide additional distribution of submittals, not included in foregoing copy submittal requirements, to subcontractors, suppliers, fabricators, installers, governing authorities, and others as necessary for proper performance of the work. Include such additional copies in transmittal to Architect where required to receive Action marking before final distribution. Show such distributions on transmittal forms.

3.03 COLOR SELECTIONS

A. All colors for all finished surfaces and materials will be selected or approved by the Architect. The color selections will be made at one time to provide a complete and coordinated color schedule which, upon acceptance of the Owner, will be provided to the Contractor. Any and all specific color selections for materials not noted on drawings or in specification shall be chosen by Architect after submittal of samples.

B. It is imperative that all color information be submitted to the Architect by the Contractor before color selections can be made. If any color selection information is not available when colors are needed to meet the project schedule, the Architect will select colors from one of the named manufacturers in the Specifications, and the Contractor will be required to exactly match that color. A claim for delay will not be accepted if the color schedule is late due to the failure of the Contractor to provide the Architect with all required color information, nor will an extra be entertained if the selected color is not available from the manufacturer the Contractor intended to use but neglected to submit.

C. The Contractors are reminded of the requirement to declare all substitutions within 20 days of execution of their Contract as specified.

END OF SECTION

SECTION 01310 - QUALITY CONTROL

PART 1 - GENERAL

1.01 TRADESMEN AND WORKMANSHIP

A. Each Contractor shall ensure that tradesmen performing work at site are skilled and knowledgeable in methods and craftsmanship needed to produce required quality levels for workmanship in completed work. Remove and replace work which does not comply with workmanship standards as specified and as recognized in the construction industry for applications indicated. Remove and replace other work damaged or deteriorated by faulty workmanship or its replacement.

B. In certain instances, specification text requires that specific work be assigned to specialists or expert entities, who shall be engaged for performance of those units of work. These shall be recognized as special requirements over which Contractor has no choice or option. These assignments shall not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as "expert" for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of entire set of requirements remains with Contractor.

1.02 INSPECTION, TESTS AND REPORTS

A. Required inspection and testing services are intended to assist in determination of probable compliances of the work with requirements, but do not relieve any Contractor of responsibility for those compliances, or for general fulfillment of requirements of Contract Documents. Specified inspections and tests are not intended to limit any Contractor's quality control program. Afford reasonable access to agencies performing tests and inspections.

B. Contractors are responsible for all testing associated with their work (foundations, soils compaction, concrete, steel, roof material testing etc.) and shall submit the name of their proposed testing agency within 15 days of Notice-to-Proceed. Each Contractor is responsible to coordinate the activities of the testing agency to assure that work is tested prior to being covered up or other activities associated to the work begin.

1.03 ROOF DRAIN TESTING

A. Pre-Construction Testing: Prior to the start of any work on the roof, the Contractor shall water-flow test all roof drains (5 minutes at each drain), to determine if any full or partial drain clogs exist in the drainage system.
   1. The Owner shall have a representative at the test.
   2. The results of the testing shall be reported to the Owner, in writing, prior to the start of work.
   3. The Owner will be responsible for correction of any drain-age problems reported by the Contractor prior to the start of work.
   4. Any drains, piping, or other components, whether exposed, concealed, below grade, etc., found to be clogged after the start of construction, and not reported to the Owner prior to the start of construction, shall be cleared, repaired, or replaced as required to restore full drainage capacity. All work shall be performed by the Contractor at no additional cost to the Owner, including patching, repair or re-placement of any materials, finishes, landscaping,

etc., disturbed in gaining access to drainage components.

B. Post-Construction Testing: When all work reaches substantial completion, the Contractor shall water-flow test all roof drains (5 minutes at each drain), to determine if any full or partial drain clogs exist in the drainage system.
   1. The Owner shall have a representative at the test.
   2. Report the results of testing to the Owner in writing prior to preparation of the final punchlist inspection.
   3. Any drains, piping, or other components, whether exposed, concealed, below grade, etc., found to be clogged shall be cleared, repaired, or replaced as required to restore full drainage capacity. All work shall be performed by the Con-tractor at no additional cost to the Owner, including patching, repair or replacement of any materials, finishes, landscaping, etc., disturbed in gaining access to drainage components.

1.04 ROOF DRAIN PROTECTION

A. Contractor is to make every effort to prevent materials from entering roof drains. Contractor is to install roof rain filters prior to removal of any roof materials.
B. All debris is to be cleaned away from drains at the end of each day.

PART 2 - PRODUCTS

2.01 ROOF DRAIN FILTERS

A. Tiddy Gutter DF100001 Roof Drain Foam Filter or Equal.

PART 3 - EXECUTION

3.01 REPLACEMENT OF WORK

A. The Contractor shall, within 24 hours after rejection of Work, remove all materials and equipment so rejected and immediately replace said Work, at his cost, to the satisfaction of the Architect. Should the Work of the Owner or other Contractors be damaged by such removal or replacement, the Contractor shall reimburse the Owner or other Contractors for all cost incurred for correcting said damage.

3.02 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
   1. Before construction, verify the location and points of connection of utility services.
B. Existing Utilities: The existence and location of underground and other utilities and construction

indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping, and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions prior to work starting: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.03 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's/Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.04 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing conditions and dimensions. If discrepancies are discovered, notify Architect and

Owner promptly.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
      Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Only use the best quality tools and equipment with proper attenuations for the latest acceptable sound levels.

F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.

G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

END OF SECTION

SECTION 01320 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. Specific administrative and procedural minimum actions are specified in this section, as extensions of provisions in General Conditions and other Contract Documents. Nothing in this section is intended to limit types and amounts of temporary work required, and no omission from this section will be recognized as an indication that such temporary activity is not required for successful completion of the work and compliance with requirements of Contract Documents.

B. Each Contractor is specifically assigned certain responsibilities for temporary facilities to be used by all Contractors, other entities at the site, the Owner's work forces and other personnel including occupants of the project, the Owner, the Architect, test agencies, personnel of governing authorities, and similar entities and personnel authorized to be at the project site during construction. In general, each Contractor is assigned the responsibilities for installation, operation and removal of each temporary facility which is related by recognized trades to its scope of contract work; and, except as otherwise indicated, each is responsible for costs and use charges associated therewith, including fuel, power usage, water usage and similar usage costs. The Contractor is responsible for temporary facilities not related to any other Contractor's scope of contract work and not otherwise specifically assigned, as designated by the Architect.

C. No costs or usage charges for temporary facilities are chargeable to the Owner, nor can any Contractor's cost or usage charges for temporary facilities be accepted as the basis for a change order extra. The total costs and usage charges for temporary facilities are included, collectively, in the Contract Amounts.

1.02 GENERAL REQUIREMENTS

A. Each Contractor shall provide and operate all hoists, cranes, helicopters and furnish and erect all ladders and scaffolding required by him and his subcontractors, constructed to afford proper protection to craftsmen, their Work and other Work in progress and previously executed.

1.03 JOB CONDITIONS

A. Each Contractor shall establish and initiate use of each temporary facility at time first reasonably required for proper performance of the total work of project. Terminate use and remove facilities at earliest reasonable time, when no longer needed or when permanent facilities have, with authorized use, re-placed the need.

B. Each Contractor shall install, operate, maintain, and protect temporary facilities in a manner and at locations that will be safe, nonhazardous, sanitary, protective of persons and property, and free of deleterious effects.

1.04 ENVIRONMENTAL PROTECTION

A. Each Contractor shall provide facilities, establish procedures, and conduct construction activities in a manner that will ensure compliance with environmental and other regulations controlling construction activities at project site. The Contractor shall designate one person, the Construction

Superintendent or other, to enforce strict discipline on activities related to generation of wastes, pollution of air/water/soil, generation of noise, and similar harmful or deleterious effects which might violate regulations or reasonably irritate persons at or in vicinity of project site. Anti-pollution measures required by D.E.P., as applicable are to be followed.

1.05 SECURITY

A. The Contractor shall maintain complete security on the site at all times during and outside of normal working hours to protect the Work and all field offices, and to secure the area of construction by restricting all trespassers.
   1. This means locking the doors and/or gates. A guard is not required.
B. Provide a six foot chain link fence around any compounds and/or dumpsters related to this project.

1.06 TEMPORARY CONSTRUCTION FACILITIES

A. Where mud, snow, ice, or other hazardous conditions exist in the purview (Scope of Work) of any Sub Contractor, the Contractor shall remove the hazards immediately and replace with suitable material for the other contractors use. If the Owner is compelled to remove the hazards with their own forces due to inaction by the Contractor, then that Contractor will be back-charged for the work performed by the Owner.
B. No welding, cutting by torch, or Work utilizing or causing flammable waste shall be done unless adequate fire protection is provided and maintained for the duration of the Work in the area of operations.
C. Contractor is to provide road safety and traffic controls when working on or near any roadway or sidewalk on campus. Including flag personnel, signage, cones, and all necessary safety measures to assure the safety of the pedestrians and vehicles at all times. This includes escorting deliveries using equipment other than a truck or car on roadways and walkways with a flag person. Backhoes can be run without an escort.

1.07 DEBRIS CONTROL (Refer to Section 01524 for further delineation)

A. The Contractor shall be responsible for daily cleaning up of spillages and debris resulting from his operations and from those of his Subcontractors; and shall be responsible for complete removal and disposition of hazardous and toxic waste materials. The Contractor shall provide containers at grade, sufficient for the depositing of nonhazardous/nontoxic waste materials, and shall remove such waste materials from project site at least weekly during cold weather (daily high temperatures below 50oF) and at least twice weekly during mild and warm weather.
   1. Contractor is responsible to provide and pay for all dumpsters.
B. The Contractor shall daily clean all mud, dirt and debris resulting from all trades operations from the adjacent streets, sidewalks, drives and parking areas and shall repair all damage caused by the cleaning to the satisfaction of the Owner.
C. The Contractor is to provide and maintain appropriate means of trash disposal (i.e., chutes) to grade/dumpster. Multiple units may be required and shall be figured for in the bid.

PART 2 - EXECUTION

2.01 ENCLOSURES

A. At earliest possible date, the Contractor shall secure project area against unauthorized entrance at times when personnel are not working. Provide secure temporary enclosure at ground floor and other locations of possible entry, with locked entrances.

B. Where any form of demolition will expose the interior of the building to weather, demolition shall follow the erection of weatherproof walls by the Contractor installed inside the demolition line, sealed, and flashed, as required, to keep all water from the building interior. Keep temporary weatherproofing in place until new construction has been completed to the stage where water will not enter the building.

C. The Contractor shall provide constant protection against rain, wind, storms, frost, or heat to maintain the work, materials, apparatus, and fixtures free from damage. At the end of each day's work, cover work likely to be damaged. During cold weather, protect work from damage by freezing and provide such enclosures and heating apparatus as may be necessary diligently to prosecute the Work without stoppage for reason of unfavorable weather.

D. Wherever a Contractor provides openings through walls or slabs, each location shall be adequately protected at the end of each working day with temporary enclosures to make these areas tight. Openings through exterior walls shall be watertight.

E. Install an 8 foot high fence around the entire site with wind screening. Provide gates as needed to properly access the site to complete the work. Remove the fence once the project is substantially completed. Fence is to have poles into the ground where the fence will be untouched per a period of time, and can have feet with sandbags in areas that the fence may have to be moved occasionally to not interfere with the work.

F. For renovation projects: Contractor is to maintain the building in a watertight condition during all construction activities by whatever means necessary. Contractor is to never do any more removal work during any given day than that contractor can replace in the same day in order to make sure the occupants of the building will be protected from the possibility of water leakage into the building. Should any leakage occur, the contractor is to immediately make the building watertight (on a 24 hour basis) and repair any damage caused by the leakage or replace any equipment damaged by the leakage.

2.02 TEMPORARY ELECTRICITY

A. Power is available on site.

2.03 TEMPORARY VENTILATION

A. A trade requiring ventilation for Work shall provide fans to induce circulation of air.

2.04 TEMPORARY TELEPHONES

A. Each Contractor is responsible for their own telephone service and for payment of all charges relating to that service.

2.05 TEMPORARY WATER

A. Water is available on site.

2.06 TEMPORARY SANITARY FACILITIES

A. Starting at time of start of work at project site, the Contractor shall provide and maintain self-

contained toilet units of type acceptable to governing authorities, adequate, at all stages of construction, for use of personnel at project site. Provide separate facilities for male and female personnel when both sexes are working, in any capacity, at project site. Facilities shall remain in use until completion of project. Use of permanent facilities will not be permitted.

2.07 REMOVAL AND RESTORATION

A. Prior to acceptance of the Project, each contractor shall remove temporary work for which he has been responsible.

2.08 OWNER'S RIGHTS

A. If any Contractor fails to carry out his responsibilities in providing temporary facilities, as set forth above, the Owner shall have the right to take such action as he deems proper for the protection and conduct of the Work, and to deduct the cost thereof from the amount due the Contractor at fault.

B. Extended workdays, hours, shifts, weekend work, etc. may be allowed upon coordination and approval by Architect, Owner at no additional cost to the Owner.
   1. Should the schedule begin to slip, for any reason, each contractor will be required to work additional shifts or weekends to recover the lost time. Should there be a cost to the College for this overtime work, the contractor will be required to reimburse the owner for said costs.

2.09 Parking: parking is allowed for two vehicles only. All other parking is to be at the TCNJ Carlton Avenue parking lot. The contractor is responsible to shuttle workers back and forth as needed.

END OF SECTION

SECTION 01322 – PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for the following work by the General Contractor (other primes are encouraged to document the site and construction, but not required):
   1. Preconstruction video or photographs
B. Related Sections include the following:
   1. All of Division 1.

1.03 SUBMITTALS

A. Qualification Data: For photographer.
B. Videotapes: video the existing conditions prior to start of the project and provide TCNJ with a copy of the video.

1.04 QUALITY ASSURANCE

A. Job Project Manager or Superintendent

1.05 USAGE RIGHTS

A. Obtain and transfer copyright usage rights to the Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA

A. Digital format as agreed to at the project kick off meeting.

PART 3 - EXECUTION

3.01 CONSTRUCTION VIDEOTAPES

A. Preconstruction: Before starting demolition or construction record, videotape (digital) of Project site, interior and exterior.
   1. Show protection efforts by the Contractor.
   2. Show as many existing conditions as possible prior to the start of the work.

END OF SECTION

SECTION 01330 – CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DEFINITION

A. Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Divisions 2 through 16. Time of closeout is directly related to Substantial Completion, and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation, if any, shall be applicable to other provisions of this section.

B. Substantial completion shall be defined that every material item has been installed. Nothing is missing and therefore, the punch list can begin.

1.02 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. Prior to requesting the Architect's inspection for certification of substantial completion, for either entire work or portions thereof, complete the following and list known exceptions in request:
   1. In progress payment request coincident with or first following date claimed, show either 100% completion for portion of work claimed as substantially complete, or list incomplete items, value of incomplete items, and reasons for being incomplete.
   2. Include supporting documentation for completion as indicated in these Contract Documents.
      a. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   3. Submit statement showing accounting of changes to the Contract Sum.
   4. Advise Owner of pending insurance change over requirements.
   5. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications, and similar documents.
   6. All fire sprinklers, devices, alarm system, roofing system, doors, insulation, etc. requiring FM Research approval to submit certification from Factory Mutual.
   7. Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including occupancy permits, operating certificates, and similar releases.
   8. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner obtaining a signed receipt of materials delivered. Refer to individual work sections for required quantities of spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
   9. Complete start up testing of systems, and instructions of Owner's operating/maintenance personnel. Discontinue, or change over, and remove from project site temporary facilities and services, along with construction tools and facilities, mockups, and similar elements.
   10. Complete final clean up requirements.
   11. Touch up and otherwise repair and restore marred exposed finishes.
   12. Inspection: Submit a written request for inspection for Substantial Completion to Project Manager. On receipt of request, Architect and Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the

Certificate of Substantial Completion after inspection, the Project Manager will notify Contractor of items, either on Contractor's list or additional items identified by Architect that must be completed or corrected before certificate will be issued.

a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
b. Results of completed inspection will form the basis of requirements for Final Completion.

B. Upon receipt of Contractor's request, the Project Manager and Architect will proceed with substantial completion inspection. Following inspection, the Architect will either prepare the certificate of substantial completion, or advise the Contractor of work which shall be performed prior to issuance of certificate. The work remaining to be performed shall be completed prior to the punch list for final acceptance.

C. Upon receipt of Contractor's notice that work has been completed, including all punch list items, but excepting incomplete items delayed because of circumstances acceptable to the Project Manager and Architect, the Project Manager and Architect will reinspect the work. Upon completion of reinspection, the Architect will either prepare the certificate of final acceptance or advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance.

D. In the event that the work is not completed or obligations are not fulfilled as required for final acceptance and the Architect/CM is required to reinspect the work more often than the two inspections described, the Contractor shall compensate the Architect and/or the Project Manager at the rate of $500.00 for each additional site visit required for reinspection’s. The compensation shall be processed by change order as a deduction to the Contractor's Contract Sum, which amount will be paid to the Architect or Project Manager by the Owner, through a change order as an addition to the Architect's or Project Manager’s Contract Sum.

E. Substantial Completion shall be defined for this project that every element of the project/construction and the contract, based on the contract and amended drawings and specification sections, are installed and the building is deemed complete, less repairs and/or touch up type work that would be generally referred to as punch list work. If any components of the building, or site work associated with this contract are not installed, the project cannot be deemed substantially completed.

1.03 PREREQUISITES TO FINAL ACCEPTANCE

A. Prior to requesting Project Manager and Architect's final inspection for certification of final acceptance and final payment, complete the following and list known exceptions, in request:

1. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
2. Submit release of liens for all subcontractors.
3. Submit Contractor's statement that his final application, as presented, is the final bill and no other claims will be presented.
4. Submit updated final statement, accounting for additional changes to Contract Sum including change orders and allowances.
5. Submit certified copy of Architect's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed, and dated by Architect.
6. Submit one set of record documents, bound copies of maintenance/operating manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
7. Complete final clean up requirements.
8. Touch up and otherwise repair and restore marred exposed finishes.

9. Submit notarized consent of surety to final payment.
10. Submit final liquidated damages settlement statement, if required, acceptable to Project Manager and the Owner.
11. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
12. A letter from the Owner's representative certifying that he has been properly instructed in the operation and maintenance of equipment by the Contractor.
13. 10% one year Maintenance Bond.
14. Underwriter's Certificate or Electrical Sub Code Official's Approval.
15. Fire Alarm Certification and Description - NFPA form 72C including local County of Chester.
16. HVAC Contractor to submit certified balancing report.
17. Final acceptance by Architect of record documents

B. Except as otherwise indicated or requested by Project Manager/Architect, remove temporary protection devices and facilities that were installed during course of the work to protect previously completed work during remainder of construction period.

1.04 CLEAN UP

A. Remove waste materials from site and dispose of in a lawful manner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 CLEANING

A. Where extra materials of value remaining after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.

B. After Substantial Completion of the Work, each Contractor shall do the final cleaning of the surfaces of his installations as may be required by the various Specification sections.

C. After each Contractor has cleaned their work, The General Contractor shall engage a professional cleaning service to perform final cleaning of the work consisting of cleaning each surface or unit to normal clean condition. Comply with manufacturer's instructions for cleaning operations and chemicals. The following are examples, but not by way of limitation, of cleaning levels required:
1. Remove labels that are not required as permanent labels.
2. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances that are noticeable as vision obscuring materials. Replace broken glass and damaged transparent materials.
3. Clean exposed exterior and interior hard surfaced finishes, to a dirt free condition, free of dust, stains, films, and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective conditions.
4. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.
5. Remove debris and surface dust from limited access spaces including roofs, plenums,

shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

6. Vacuum and clean carpeted surfaces and similar soft surfaces.
7. Clean light fixtures and lamps to function with full efficiency.
8. Clean and wax or polish all hard floors following manufacturer's instructions.
9. Clean all window surfaces inside and outside.
10. Perform final cleaning in, on and around all casework, sinks, toilets fixtures, etc.
11. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
12. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
13. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
14. Remove tools, construction equipment, machinery, and surplus material from Project site.
15. Remove snow and ice to provide safe access to building.
16. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
17. Sweep concrete floors broom clean.
18. Replace parts subject to unusual operating conditions.
19. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
20. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
21. Clean ducts, blowers, and coils if units were operated without filters during construction.
22. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
23. Leave Project clean and ready for occupancy.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

3.02 RECORD DOCUMENTS (Refer to Section 01340, project requirements for submitting Record Documents)

3.03 REMOVE TEMPORARY FACILITIES

A. At the completion of the work prior to final payment, remove all temporary facilities entirely from site, including, but not limited to, the following: Field offices, trailers, shanties, sheds, job telephone, temporary toilets, temporary enclosures, dust barriers and other temporary protection devices.

END OF SECTION

SECTION 01340 PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Project record documents consisting of:
      a. Record drawings.
      b. Record project manual (specifications).

1.02 SUBMITTALS

A. Project Record Documents: Submit after substantial completion, but prior to final completion.
   1. Record drawings: Submit in form of opaque prints.
      a. Sets shall include all drawings, whether changed or not.
   2. Other record documents: Submit originals or good quality photocopies.
   3. Each Sub contractor is responsible for their respective trade, record documents and record drawings. Combine with General Contractor record drawing documents for a complete set.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 MAINTENANCE OF PROJECT RECORD DOCUMENTS

A. Do not use record documents of any type for construction purposes.
B. Maintain record documents in a secure location at the site while providing for access by the contractor and the architect during normal working hours; store in a fire resistive room or container outside of normal working hours.
C. Record information as soon as possible after it is obtained.
D. Assign a person or persons responsible for maintaining record documents.
E. Record the following types of information on all applicable record documents:
   1. Dimensional changes.
   2. New and revised details.
   3. Revisions to electrical circuits.
   4. Locations of utilities concealed in construction.
   5. Particulars on concealed products which will not be easy to identify later.
   6. Changes made by modifications to the contract; note identification numbers if applicable.
   7. New information which may be useful to the owner, but which was not shown in either the contract documents or submittals.

3.02 RECORD DRAWINGS

A. Maintain a complete set of opaque prints of the contract drawings, marked to show changes.
B. Where the actual work differs from that shown on the drawings, mark this set to show the actual work.
   1. Mark location of concealed items before they are covered by other work.
   2. Mark either record contract drawings or shop drawings, whichever are best suited to show the change.
C. When the contractor is required by a provision of a modification to prepare a new drawing, rather than to revise existing drawings, obtain instructions from the architect as to the drawing scale and information required.
D. Keep drawings in labeled, bound sets.
   1. Mark with red pencil.
   2. Mark work of separate contracts with different colors of pencils.
   3. Incorporate new drawings into existing sets, as they are issued.
E. Where record drawings are also required as part of operation and maintenance data submittals, copy marks to another opaque print obtained from the architect.

3.03 RECORD PROJECT MANUAL

A. Maintain a complete copy of the project manual, marked to show changes.
B. Where the actual work differs from that shown in the project manual, mark the record copy to show the actual work.
   1. Include a copy of each addendum and modification to the contract.
   2. In addition to the types of information required on all record documents, record the following types of information:
      a. Product options taken when the specification allows more than one.
      b. Proprietary name and model number of actual products furnished, for each product, material, and item of equipment specified.
      c. Name of the supplier and installer, for each product for which neither a product data submittal nor a maintenance data submittal was specified.

3.04 TRANSMITTAL TO OWNER (through the Architect)

A. Collect, organize, label, and package ready for reference.
   1. Bind print sets with durable paper covers.
   2. Label each document (and each sheet of drawings) with "PROJECT RECORD DOCUMENTS This document has been prepared using information furnished by _____" [insert the contractor's name], and the date of preparation.
B. Submit to the Project Manager for transmittal to the Architect, unless otherwise indicated.
C. Submit to the Architect four (4) sets of Operation and Maintenance Manuals in three-ring binders, by volume, and indexed per binder (with one master index) to be transmitted to the Architect/Engineer for approval: All to be submitted at one time, not piece meal. Indexing should follow the specification section numbers.
   1. Include all inspection/approvals/certifications
   2. All approved submittals and cut sheets as well as manufacturer's operation and maintenance manuals for each section.
   3. Manuals are to be completed in volumes, three ring binders, starting with Division 1 and continuing through the last projects Division. The number of volumes is determined by the number of spec section the projects has and by the amount of paper/copies for complete sets of three ring binders.

4. List of all contractors and vendors for the project with names, addresses and phone numbers.

END OF SECTION

SECTION 01524 – CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.

B. Related Sections include the following:
   1. All of Division 1 and attached specifications and drawings that make a part of this contract.

1.03 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.04 SUBMITTALS

A. Waste Management Plan: Submit 4 copies of plan within 30 days of date established for the Notice to Proceed.

B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

1.06 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
   2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
   3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
   4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
   5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Project Manager. Provide handling,

containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section "Temporary Facilities" for operation, termination, and removal requirements.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
   2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Sale and Donation: Not permitted on Project site.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle beverage containers used by on-site workers.
B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.
C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
      a. Inspect containers and bins for contamination and remove contaminated materials if found.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to present windblown dust.
   3. Stockpile materials away from construction area.
   4. Store components off the ground and protect from the weather.
   5. Remove recyclable waste off Owner's property and transport to recycling receiving or processor.

3.04 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
B. Concrete: break up and sort rebar as best as possible. Recycle all concrete.
C. Recycle all metal products from the building before demolition (aluminum, steel etc.)
D. Recycle as much product as possible and provide a complete report to TCNJ to confirm the percentage recycled on the project.

3.05 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:
1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

3.06 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials on site.
C. Burying: Do not bury waste materials on site.
D. Disposal: Transport waste materials off Owner's property and legally dispose of them.
E. Washing waste materials into sewers or drains is not permitted.

END OF SECTION

DIVISION 23 - HVAC

SECTION 23 05 00 - STANDARD CONDITIONS FOR HVAC

PART 1 - GENERAL

1.01 REFERENCE

A. Requirements established within the portions of this project manual titled Division 1, General Requirements are collectively applicable to the work of this section.
B. Instructions to Bidders, Special Conditions and addenda as issued are part of this specification.
C. Mechanical, Plumbing, and HVAC drawings along with all other project drawings and specifications represent the work of this section.
D. Drawings, Contract, General Conditions and Supplementary Conditions form a part of this section, by reference thereto and shall have the same force and effect as if printed herewith in full. Failure to review these sections shall not relieve the Contractor of his responsibility to fully comply with the terms therein.

1.02 SCOPE

A. Provide all labor, material, equipment, and supervision necessary to disconnect and remove the existing heating system in its entirety including, but not limited to; radiators, steam piping, condensate return piping, pumps, baseboard radiation, controls, supports, hangers, and all associated insulation, equipment pads, and accessories. Patch and repair openings in walls, floors, and ceilings, for piping and equipment that was removed. Pipe, conduit, ductwork, and wiring shall be cut back in the attic so that a patch can be placed over the opening.
B. Provide labor, material, equipment, and supervision necessary to install complete operating mechanical systems as indicated on the drawings and specified herein, including all work at the site and within the proposed construction areas to accomplish the required work.
C. It shall be the contractor’s responsibility to coordinate his work and the work of his subcontractors to insure that all the work is covered. He shall designate who is responsible for various portions of work which may overlap so that there is complete coverage of all required work. It is the position of the owner and the A/E that all work is the responsibility of the mechanical contractor within this Division of the work.
D. Contractor shall provide all demolition necessary to remove and repair, install new or modify existing work whether it be walls, floors, ceilings, structure, mechanical or electrical required to install his work. Contractor shall replace all work to leave in a finished condition.
E. All work shown on the drawings and not expressly mentioned in the specifications and all work specified but not shown on the drawings, but necessary for the proper execution of same shall be performed by the contractor. It is not the intent of the drawings and specifications to describe every feature and detail of the work.
F. No additions to the contract amount will be approved for any materials, equipment, or labor to perform additional work unless it can be clearly shown to be beyond the scope and intent of the drawings and specifications.
G. HVAC contractor's scope of work shall include but not be limited to the following:

1. Air distribution system, associated ductwork, equipment, and insulation.
2. Steam and condensate drainage systems, equipment, and insulation.
3. Condensate drainage system (air conditioner units). Condensate pumps.
4. Demolition of existing work for new work.
5. Test Balance & Adjust.
6. Repair existing areas affected by the new construction. Patch, repair and finish to match existing.
7. Connecting to existing building automation system and automatic temperature controls.
8. Refer to Commissioning of Systems Specification for additional work.
9. All other work identified in Division 23 and/or on the mechanical drawings except that identified as plumbing or fire protection work.
10. Contractor shall not utilize new HVAC equipment for temporary heating, cooling, and dehumidification purposes. Temporary HVAC is to be provided as described under the architect's general conditions. Contractor is to protect all HVAC equipment during construction and cover all ductwork openings.
11. Provide third party certification of all packaged systems by a Nationally Recognized Testing Laboratory (NRTL) in accordance with OSHA Federal Regulations 29CFR1910.303 and .399 as well as Pamphlet #70 and National Electrical Code Article 90-7.

1.03 REGULATIONS, CODES, AND STANDARDS

A. Work shall be performed in accordance with the latest adopted codes, amendments, regulations, and ordinances of the authorities having jurisdiction. Observe all safety regulations including the requirements of OSHA.
B. Obtain and pay for all permits, connection charges, inspections, and certificates required to complete the work.
C. Latest editions of any referenced standards shall govern.
D. Contractor shall arrange and pay for all tests and inspections specified herein or required by above agencies and furnish required certificate of inspection to owner.
E. Where the contract documents are more stringent but not in conflict with the applicable codes, the more stringent requirements shall be followed.

1.04 SUBMISSIONS

A. The procedure for submissions of shop drawings shall be as specified in Division 1, or as a minimum, as indicated below.
B. Furnish submissions of shop drawings and samples of materials and equipment as indicated in these sections, on the drawings, or as directed by the A\E. Submissions will be made in a timely fashion such that adequate time exists to review the drawings, or material, and arrive at the site in accordance with the project schedule.
C. Submissions will not be accepted with work defined as "By Others". Identify contractor by name and with his approval so indicated. Submissions are required prior to purchasing, fabrication, or installation of any material or equipment. Submissions shall be reviewed and certified by the submitting contractor that they are in accordance with the project documents.
D. When requested by the engineer, shop drawings shall be required to be submitted to designated agencies for review and approval prior to submission to the engineer.
E. Contractor shall arrange and pay for all tests and inspections specified herein or required by above agencies and furnish required certificate of inspection to owner.
F. Contractor to forward a copy of submittals which have electrical requirements to the Electrical Contractor (EC) for coordination of voltage, amperage, and phase. Response to be received from

EC prior to ordering of equipment by mechanical contractor.

G. Submissions shall include warrantees by the manufacturer for equipment being provided. Submissions for commonly related items such as fixtures, trim, carriers, drains shall be combined in a single brochure with all items being furnished clearly identified.

H. Shop drawings and submittals shall be checked and stamped by the contractor before submitting. They shall conform to measurements made at the site, the contract requirements, and coordinated with all other trades.

I. Specific models in catalog sheets must be identified as well as all options, voltages, phases, etc. identified so as to be clear on what is being provided.

J. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/travel/access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

1.05 SITE INSPECTION

A. Visit site, inspect, and become aware of all conditions which may affect the work. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.

B. Submission of bid will be deemed evidence of having complied with this request. Contractor may not request additional costs for existing conditions which were evident from inspection of the site.

1.06 SUBSTITUTIONS

A. Material and equipment specified shall be deemed as that which the bidder’s quotation represents.

B. Once bids are accepted only that material and equipment listed in the specifications or added by addenda shall be acceptable. Substitution information for inclusion in an addenda must be received by the A\E at least 10 days prior to bid opening. If acceptable, an addenda will be issued which will add the additional acceptable manufacturers or materials and be available for all contractors to consider. It shall be a basic premise that a contractor is a lowest bidder because he utilized substituted materials or equipment as opposed to specified materials or equipment.

C. If the contractor submits alternate equipment, manufacturers, systems, methods, or materials, not specifically identified in the specifications, additional review and investigation time may be required by the engineer. If the engineer determines additional review time is required because of the substitution, then this will be a billable service by the engineer at the rate of $150.00/hr. for such services. Also billable will be any redesign time and revisions to drawings should they be necessary for incorporation into the work. Services will be billable to the contractor making such substitutions and will be payable prior to approval or rejection.

D. If the contractor elects to submit alternate equipment, manufacturers, systems, methods, or materials, not specifically identified in the drawings and specifications, it is the contractor’s responsibility to coordinate the work with other trades and pay for any associated costs with the substitution or change.

E. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/travel/access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be

fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

1.07 DRAWINGS AND SPECIFICATIONS

A. The drawings are generally diagrammatic and necessary field coordination and adjustment must be provided by the contractor prior to installation. Such deviations to the work to allow for coordination shall be kept to a minimum and any such deviations shall be at no extra cost.
B. When a conflict or contradiction exists either between drawings and specs or between specs or between different drawings or details, the more stringent shall apply.
C. Drawings and specifications are intended to be taken as a whole and each is to supplement the other. It is not intended that all work must be both shown on drawings and specified in the specifications.
D. An item shown on the drawings and not indicated in the specifications is to be understood to be required for the project. An item specified and not shown on the drawings is to be understood to be required for the project.
E. The architects or engineer's interpretation of the documents shall be binding upon the contractor. If a question arises, the contractor shall ask for an interpretation prior to bidding and an answer shall be issued as an addendum to all bidders.
F. If a question arises after bidding the A/E interpretation shall govern.

1.08 MEASUREMENTS

A. Before ordering materials or commencing with any work, the contractor shall verify all measurements at the building. Coordination of equipment, materials, spaces, and dimensions are the responsibility of the contractor.

1.09 PROGRESS SCHEDULE

A. Provide a project schedule which shall show start, sequence of each type of work, milestone schedule, and completion of each type of work, with overall completion date.

1.10 COST SCHEDULE

A. Provide a detailed cost breakdown indicating labor and material amounts for various types of work.
B. AIA forms are required for this submission.

1.11 COMPLETION

A. The contractor shall deliver to the owner, with his request for final payment, copies of all manufacturer's guarantees, equipment instructional manuals, a complete set of all final shop drawings, catalog cuts, service contracts, and other items as may be required elsewhere in the documents.

1.12 OFFICE

A. The contractor shall set up his job office (desk) where directed by the owner.

1.13 STORAGE

A. Material shall be stored only where directed by the owner.

1.14 SANITARY

A. The contractor will at his own expense, provide and maintain in a sanitary condition, a portable chemical toilet.
B. Toilet will be located where directed by the owner.

PART 2 - PRODUCTS

2.01 GENERAL

A. All material shall be new and of present day manufacture.
B. All material and equipment shall be in conformance with accepted trade standards.
C. Whenever equipment or material is referred to in the singular, such as "the fan", it shall be deemed to apply to as many such items as may be necessary to complete the installation.
D. The word “provide” means “furnish and install complete, tested, and adjusted as necessary with all accessories, covers, escutcheons”. The word “piping” means pipe, fitting, controls, valves, and hangers as required for a complete system.

2.02 MOTORS

A. Incorporate latest IEEE and NEMA standards.
B. All copper windings with ball bearings.
C. Indoors; drip proof, 40 degree C rise.
D. Outdoors; totally enclosed 55 degree C rise.
E. Motors over 10 HP to be high efficiency with PF in excess of 0.9.

2.03 MOTOR STARTERS AND CONTACTORS

A. Fractional with horsepower up to ½ HP; electrical contract.
B. Polyphase and single phase above ½ HP: this contract.
C. Electrical contractor shall install all starters except for those provided as an integral part of equipment.
D. Polyphase starters shall be magnetic combination type, across-the-line electrically operated, electrically held, three pole assemblies, with arc extinguishing characteristics, silver to silver renewable contacts, 3 pole thermal bi-metallic, red run pilot light, individual phase protection, with overload heaters matched to motors installed and with 4 auxiliary contact, Hand-off-Auto switch, and control transformer.
E. For single phase motors above ½ HP provide magnetic combination single phase motor starters with overloads, non-fusible disconnect switch, red run pilot light, integral 120 volt control transformer with dual primary fusing auxiliary contacts.
F. Starters shall be as manufactured by G. E., Siemens, Square "D", Cerus or Cutler-Hammer.

2.04 EQUIPMENT START UP

A. Verify that equipment is operating within warranty requirements.

B. Advise owner and A/E at least two days prior.
C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to A/E.

2.05 LUBRICATION

A. Lubricate all equipment in accordance with manufacturer's instructions.
B. Lubricate prior to start up.
C. Provide one year's supply of lubricants to the owner.

2.06 OPERATING INSTRUCTIONS AND MANUALS

A. Properly and fully instruct owner's personnel in the operation and maintenance of all systems and equipment.
B. Insure that the owner's personnel are familiar with all operations to carry on required activities.
C. Such instruction shall be for each item of equipment and each System as a whole.
D. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalogue cuts, wiring diagrams, control sequences, service requirements, piping diagrams, names, and addresses of vendors, suppliers, and emergency contacts. Three manuals shall be provided.
E. Provide to the owner any special tools necessary to operate any of the equipment.

2.07 DRAIN PANS

A. Provide auxiliary galvanized steel condensate drain pan with 1" MPT drain connection for all interior fan coil units, cooling coils, heat pumps, and any other cooling equipment requiring condensate removal. Drain to suitable discharge point acceptable to owner and A/E. Drain lines shall be separate and independent of A/C unit drain system unless provided with interlocked water sensing switch.
B. All water heaters mounted above the floor shall be provided with drain pans. Drain to suitable discharge point acceptable to owner and A/E. To be visible outfall.
C. Drains shall slope down in direction of flow at 1" per 10 feet.

PART 3 - EXECUTION

3.01 PROTECTION

A. Cover duct openings during construction.
B. Plug or cap open ends of piping systems and conduit.
C. Stored materials shall be covered to prevent damage by inclement weather, sun, dust, or moisture.
D. Protect all installed work until accepted in place by the owner. Cover plumbing fixtures and lighting fixtures.
E. Do not install plates, polished metal escutcheons, thermostats, and other finished devices until masonry, tile, and painting operations are complete or protect otherwise.
F. Protect all existing or new work from operations which may cause damage such as hauling, welding, soldering, painting, insulating, and covering.

3.02 WORKMANSHIP

A. Install all work neat, trim, and plumb with building lines.
B. Install work in spaces allocated.
C. Cutting and patching shall be performed by skilled tradesmen normally employed for the work involved.

3.03 EXCAVATION, SHORING, PUMPING, BACKFILLING

A. Perform all excavation required to install the work. Deposit excavated material so as not to create a slide hazard.
B. No work shall be placed on rock. Cushion with 6 " layer of crushed stone.
C. Protect tree roots with burlap covering and maintain moist until backfilled.
D. Base estimates on excavation which will include earth, sand, clay, rubbish, debris, and all other materials up to one cubic yard in size. Boulders or rock larger than one cubic yard which need to be broken up with pneumatic equipment or explosives will be separately negotiated at the time of discovery with the owner and A/E. Do not proceed with rock excavation until an agreement is reached.
E. Maintain excavations free of water.
F. Shore excavations to prevent cave-in in accordance with OSHA regulations and to prevent strains on work put in place until ready to receive backfill.
G. Backfill with clean material and pneumatically tamp in 8" layers. Remove excess material, including rock, from site or as directed by the A/E.
H. Backfill piping trenches within 18" of footings, columns, piers, or grade beams, with concrete. Protect piping from direct contact and adherence to concrete.
I. Return to original condition any areas disturbed for excavation.

3.04 FASTENERS, HANGERS, AND SUPPORTS

A. Furnish and install all hangers and supports required to suspend, mount, or hang the work.
B. Furnish and install all miscellaneous steel angles, channels, beams, clips, brackets, and anchors to hang or support the work. Provide submissions for review.
C. Install concrete inserts before concrete is poured.
D. Drilled inserts shall not be loaded to more than 1/4 rated capacity with a minimum of 200 lbs.
E. Powder driven fasteners shall not be allowed for piping larger than 2", or for equipment. When used they shall not be loaded more than 1/8 rated capacity with a minimum of 200 lbs.
F. All hangers, miscellaneous steel, braces, and supports shall be galvanized, cadmium plated, or painted with corrosion resistant primer and finish coat of epoxy enamel.
G. Piping shall be supported from adjustable clevis type hangers with insulation pipe saddles as indicated in the piping system specification sections. Piping shall not support other piping.
H. Support vertical piping and ductwork at floor levels. Piping shall have split rings. Ductwork shall have 1 1/2" angle iron frames.
I. Provide and install lintels where required for mechanical work and not indicated on architectural or structural drawings.
J. Furnish steel framing for roof openings and floor openings. Submit details for review.

3.05 SLEEVES

A. All piping passing through floors or walls shall have sleeves unless holes are cored. Sleeves shall be 16 gage galvanized steel in non-bearing walls, 10 gage galvanized steel for bearing walls, and

schedule 40 galvanized pipe in floors. Sleeves shall accommodate insulation. This shall not apply to sprinkler piping.

B. Sleeves passing through foundation walls not exposed to interior spaces or sleeves passing through slab on grade may be schedule 40 PVC.
C. Wall sleeves shall finish flush with wall.
D. Floor sleeves shall extend 1 inch above floor.
E. Sleeves in walls between interior spaces and unexcavated, exterior, crawl, or backfilled spaces shall be made watertight with "Link-Seal" modular wall and casing seal. Casing shall be schedule 40 galvanized pipe with anchor flange.

3.06 PLATES

A. Furnish and install chrome plated plates wherever piping passes into finished areas.
B. Plates shall be securely fastened to piping or building construction.
C. Floor plates shall cover one inch floor extension.

3.07 OFFSETS, TRANSITIONS, MODIFICATIONS

A. Furnish and install all offsets necessary to install the work and to provide clearance for the other trades.
B. Maintain adequate headroom and clearance as directed by the A/E.
C. Ductwork transitions necessary to accommodate available space or clearance requirements shall be contract requirements.
D. Incidental modifications necessary to the installation of the systems shall be made as necessary and at the direction of the A/E.
E. Rises and drops of piping systems shall be provided as required and where directed to allow for clearances to other construction. Drains shall be installed at no additional cost to the owner. The contractor shall allow for such occurrences in his bid.
F. Ductwork, piping, conduit, and equipment shall be so arranged as to not pass in front of windows, doors, access panels, access doors, coil removal or filter removal space or service clearance areas. Do not install within 3'-0" clearance of electrical panel fronts.

3.08 RECESSES

A. Furnish information to the general contractor as to sizes and locations of recesses required to install panels, boxes, grilles, and other equipment or devices which are to be recessed into walls.
B. Make offsets or modifications as required to suit final locations.

3.09 EQUIPMENT SETTING

A. Furnish and install as a minimum, a 4" thick concrete pad beneath all floor mounted equipment in mechanical rooms, boiler rooms, or equipment rooms, or outside on grade. This shall not apply to residential installations of water heaters and air handling units or furnaces unless detailed on drawings or specified elsewhere.
B. Furnish and install as a minimum, spring vibration isolators under any equipment 5 HP and over and rubber-in-shear vibration isolation under all equipment less than 5 HP. This shall apply to residential installations.
C. Reinforce concrete with No. 4 rods 12" on centers both ways.
D. Pad to have 3/4" dowels into concrete at 1 per 4 square feet.

3.10 LABELING

A. All equipment, panels, controls, safety switches, and devices shall be provided with permanent black laminated white core labels with 3/8" letters.
B. This shall also apply to all controllers, remote start/stop push buttons, equipment cabinets, and where directed by the A/E.
C. This shall not apply to local room thermostats and light switches.

3.11 FLASHING AND COUNTERFLASHING

A. Piping and conduit through the roof shall be flashed by the General Contractor. This contractor shall furnish counterflashing.
B. Ductwork through the roof and roof mounted duct connected equipment shall be provided with prefabricated roof curbs. General contractor shall flash. This contractor shall counterflash.
C. Structural dunnage for roof mounted equipment shall be flashed and counterflashed. Prefabricated roof curbs may be utilized.

3.12 ACCESS

A. Locate all equipment, valves, devices, and controllers which may need service in accessible places.
B. Where access is not available; access panels shall be provided. Furnish prime painted steel access doors to the General Contractor for installation.
C. Access doors shall be 16 gauge frames and 22 gauge steel door. Access doors in fire rated walls shall have a "B" label for 1 ½ hours.
D. Maintain clearances for tube removal, coil pulls, and filter removal.

3.13 WIRING

A. Power wiring shall be provided by the Division 26 Electrical Contractor. This contractor shall furnish all 3 phase starters, pushbuttons, and controllers necessary to operate the equipment. The Electrical Contractor shall store and install the electrical devices and furnish and install the power wiring.
B. Control wiring shall be furnished and installed under Division 23 portion of the work. Wiring for controls is control wiring whether it is line voltage or low voltage.
C. All wiring shall be in accordance with the NEC.
D. Pushbuttons shall be maintain-contact type.
E. Refer to the electrical specifications for wiring methods.
F. Plenum rated cable is required for control wiring.

3.14 UTILITIES

A. Do not interrupt any utility or service without adequate previous notice and scheduling with the owner.
B. Refer to Division 1 for requirements for providing temporary utilities.

3.15 CUTTING AND PATCHING EXTERIOR SERVICES

A. This contractor shall be responsible for returning disturbed areas to original condition where excavation for utilities has been required.
B. Cut and patch paved areas to match original surfaces.
C. Properly tamp backfill before finishing surfaces.

D. Concrete pavements and curbs shall be formed and poured to match adjacent areas.
E. Grass areas shall be sodded and maintained until established growth is achieved.

3.16 GUARANTEE

A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the owner unless otherwise specified. Material and labor for first year warranty is to be provided.
B. Guarantee shall be extended for all non-operational periods due to failure within the guarantee period.
C. Compressors and refrigeration system components shall be provided with a 5 year factory warranty. Material only for years 2 through 5 is required.

3.17 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver material and equipment in manufacturer's original cartons or on skids.
B. Store material in dry enclosures or under protective coverings out of way of work progress.
C. Handle so as to prevent damage to product or any surrounding material.

3.18 MANUFACTURERS' NAMES

A. Manufacturers' names are included herein to establish those suppliers who may provide products for this project subject to the requirements of the specifications. Although a manufacturer's name may appear as an acceptable supplier it is not understood that a standard product is acceptable. Products must also meet the technical, performance, and physical requirements of the project as well as being named in the specification. Any deviations from this must be acknowledged at bid time by the supplier and he shall be solely responsible for any and all costs associated with the application of his product in the project.
B. A design cannot be prepared which accommodates the installation of all suppliers and is not intended to do so. If certain modifications must be made to accommodate one particular supplier's equipment it shall be considered the contractor's responsibility to arrange for such accommodations and be financially responsible for same.

3.19 AS-BUILT DRAWINGS

A. At the completion of the work the contractor shall furnish a reproducible as-built drawings to the A/E for approval. The drawings shall indicate all work installed and its actual size and location. If acceptable, the A/E will submit the as-built drawings to the owner as record drawings. If not acceptable, the A/E will return the drawing to the contractor to make corrections as required. The contractor will resubmit for approval.
B. The as-built drawings shall indicate measured dimensions of underground lines and other concealed work.

3.20 PENETRATION SEALING

A. All penetrations of Natatorium walls, fire walls, smoke walls, and floors by ducts, pipes, conduit, or wiring shall be sealed to prevent the flow of gasses or smoke.
B. The sealant shall be foamed in place between the penetrant and the adjacent floor or wall with DOW Corning RTV foam or equivalent by 3M, Hilti, or Chase foam.
C. The installation shall meet the approval of the authority having jurisdiction.

D. Penetrations through rated surfaces shall have a UL rating equivalent to the adjacent surfaces.
E. All other penetrations of walls either above ceilings or exposed shall be closely sealed around the penetration with caulking or packing to prevent flow of air or sound through the wall.

3.21 CUTTING AND PATCHING INTERIOR SURFACES

A. Respective contractor shall install all hangers, supports, pipe sleeves in floors, walls, partitions, ceilings, and roof slabs as construction progresses to permit their work to be built into place and to eliminate unnecessary cutting of construction work.
B. All cutting of concrete, or other material for the passage of piping and ductwork through floors, walls, partitions, and ceiling shall be done by the respective contractor where necessary to install his work. Respective contractor will close all such openings around piping, ductwork, and conduit with materials equivalent to that removed. All exposed surfaces shall be left in suitable condition for refinishing without further work.
C. Contractor shall patch and repair any existing openings created by the demolition work in floors, walls, partitions, and ceilings not being reused for the new construction.

3.22 INVERTS AND ELEVATIONS

A. Indicated inverts and elevations of existing utilities are approximate and based on the best information available.
B. Upon of award of contract, contractor shall verify in the field all such information and report any discrepancies before proceeding with work. Contractor shall be responsible for extra work caused by his failure to verify inverts and elevations.

3.23 COORDINATION DRAWINGS

A. Provide 3/8" = 1'-0" scale drawings showing all coordinated ductwork, piping, conduit, and equipment of all trades.
B. The sheet metal shop drawings may be used as the basis of these drawings.
C. Show ductwork, walls, beams, steel, drainage piping, domestic water piping, HVAC piping, sprinkler piping, light fixtures, electrical conduit, and equipment.
D. Contact other disciplines and obtain information to identify fully coordinated systems.
E. Submit for review and approval to the A/E.
F. Provide all dimensional data and necessary clearances to other trades for installation of fixtures and equipment within casework and counter tops.
G. Work shall not proceed until coordination is completed and all conflicts, issues, sequences etc., are resolved.

3.24 SAMPLE CONSTRUCTION

A. One double and one single patient room shall be constructed and approved by the owner, architect/engineer, and code officials (authority having jurisdiction, fire marshal, inspectors) before all other rooms are constructed. Contractor to obtain written approval prior to constructing remaining rooms.
B. This room shall represent the standard against which all others will be constructed.
C. Installation will include all units, ducts, piping, wiring, fixtures, devices, etc., which are required for complete rooms.
D. Unit shall be operated to determine acoustic acceptability.

3.25 WELDING

A. All electric power for arc welding shall be supplied by the contractor performing the work.

3.26 VEHICLES

A. Vehicle access to the site will be as directed by the owner.

3.27 RUBBISH DISPOSAL

A. Burning of debris on the site shall not be permitted. All debris, refuse, and waste shall be removed from the premises at regular intervals. No accumulation shall be permitted.

3.28 PROTECTION

A. Maintain all public walks and access ways.
B. Erect and maintain barricades, warning signs, and other protective means as may be directed by the owner for protection of all persons and property from injury or damage.

3.29 SCAFFOLDING

A. The contractor shall at his own expense, install, operate, protect, and maintain temporary services such as scaffolding, material hoists, access walks, etc., as may be required.

3.30 UTILITIES (Applies only to existing facilities)

A. The contractor may use the existing water and electric power for temporary construction needs.
B. The owner will direct where these services may be tapped.
C. Those services that are used during construction, but are to remain, shall be refurbished to as new condition before turning back to the owner.

3.31 CLEANUP

A. Remove all visible temporary tags or labels as well as any protective coverings and wrappings from fixtures and equipment.
B. Remove all spots, stains, soil, paint, spackle, and other foreign matter from all finished work.
C. Clean and polish all plumbing fixtures.
D. Remove all trash and debris from the premises.

3.32 MOUNTING HEIGHTS

A. Contractor to coordinate all mounting heights with all trades and architect prior to rough-in.
B. Maximum thermostat mounting height (top of thermostat) in accordance with ADA.
    1. Side reach: 48" A.F.F.
    2. Forward reach: 48" A.F.F.

3.33 WORK COMPLETION

A. The contractor shall promptly correct work rejected by the engineer failing to conform to the requirements of the contract documents, whether discovered before or after substantial completion

and whether or not fabricated, installed or completed. Costs of correcting such rejected work, including additional testing and inspections and compensation for the engineer's services and expenses made necessary thereby, shall be at the contractor's expense.

3.34 REQUEST FOR INFORMATION (RFI) REQUIREMENTS

A. All RFI's shall include the following information based on AIA Document G716:
1. To, From, Project Name, Issue Date, RFI number in sequential order with all other trades, Requested Reply Date.
2. Provide a description with specification and/or drawing references.
3. Provide the senders recommendation including cost and/or schedule considerations.
4. Provide receiver's reply space.
5. Note an RFI reply is not an authorization to proceed with the work involving additional cost/time.

3.35 SHOP DRAWING REQUIREMENTS

A. The following is a list of required shop drawings for the project. Not all items may be identified, and it is the responsibility of the contractor to submit additional shop drawings where indicated in the specifications.

HVAC	**DATE REC'D**	**ACTION**	**DATE REC'D**	**ACTION**
COORDINATION DRAWINGS				
PIPING FLEX CONNECTION				
GAUGES				
THERMOMETERS				
AUTOMATIC CONTROL VALVES				
VALVES - ALL TYPES				
STRAINERS				
CHECK VALVES				
PRESSURE REDUCING VALVE				
STACK, BREECHING				
PIPING				
VIBRATION ISOLATION				
INSULATION A. Piping B. Ductwork				
SHEET METAL DRAWINGS				

HVAC	**DATE REC'D**	**ACTION**	**DATE REC'D**	**ACTION**
SPLIT SYSTEMS				
EQUIPMENT CURBS				
AUTOMATIC TEMPERATURE CONTROL A. DEVICES B. WIRING DIAGRAMS C. SEQUENCES				
TEST, BALANCE AND ADJUST REPORT				
AS-BUILT DRAWINGS				
WARRANTIES AND GUARANTEES				
OPERATIONS AND MAINTENANCE MANUALS				
INSTRUCTIONS				
EMERGENCY AND MANUFACTURER CONTACTS				
CONDENSATE PUMPS (STEAM, DC)				

END OF SECTION

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Metal pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Thermal-hanger shield inserts.
   4. Fastener systems.
   5. Equipment supports.

1.02 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
   1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
   2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
   3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following: include Product Data for components:
   1. Trapeze pipe hangers.
   2. Equipment supports.
C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.05 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
   3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
   4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
   5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Stainless-Steel Pipe Hangers and Supports:
   1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
   2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
   3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:
   1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

D. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.02 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop, or field fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.03 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.04 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Expansion Anchors: Insert wedge type, stainless steel anchors, for use in hardened

portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.05 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.06 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
B. Grout: ASTM C 1107, factory mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
   2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
D. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
H. Install lateral bracing with pipe hangers and supports to prevent swaying.
I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2-inch and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
L. Insulated Piping:
    1. Attach clamps and spacers to piping.
        a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
        b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
        c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
    2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
        a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4-inch and larger if pipe is installed on rollers.
    3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
        a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4-inch and larger if pipe is installed on rollers.
    4. Shield Dimensions for Pipe: Not less than the following:
        a. NPS ¼-inch to NPS 2 ½ -inch: 12 inches long and 0.048 inch thick.
        b. NPS 4-inch: 12 inches long and 0.06 inch thick.
        c. NPS 5-inch and NPS 6-inch: 18 inches long and 0.06 inch thick.
        d. NPS 8-inch to NPS 14-inch: 24 inches long and 0.075 inch thick.
        e. NPS 16-inch to NPS 24-inch: 24 inches long and 0.105 inch thick.
    5. Pipes NPS 8-inch and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
    6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.02 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.03 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
    1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    2. Obtain fusion without undercut or overlap.
    3. Remove welding flux immediately.
    4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
B. Trim excess length of continuous thread hanger and support rods to 1 ½ inches.

3.05 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting" Section 099123 "Interior Painting" and Section 099600 "High Performance Coatings."
C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.06 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.
F. Use stainless-steel pipe hangers and stainless-steel attachments for hostile environment applications. Use aluminum pipe hangers and aluminum attachments for Natatorium environment applications.
G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
H. Use padded hangers for piping that is subject to scratching.
I. Use thermal-hanger shield inserts for insulated piping and tubing.
J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2-inch to NPS 30-inch.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg. F, pipes NPS 4-inch to NPS 24-inch, requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4-inch to NPS 36-inch, requiring clamp flexibility and up to 4 inches of insulation.
   4. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2-inch to NPS 8-inch.
   5. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2-inch to NPS 30-inch.
   6. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4-inch to NPS 36-inch, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
   7. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4-inch to NPS 36-inch,

with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1-inch to NPS 30-inch, from two rods if longitudinal movement caused by expansion and contraction might occur.
9. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2-inch to NPS 42-inch if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS ¾-inch to NPS 24-inch.
2. Carbon or Alloy Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS ¾-inch to NPS 24-inch if longer ends are required for riser clamps.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1 Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2 Steel Clevises (MSS Type 14): For 120 to 450 deg. F piping installations.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
8. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
9. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.

N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1 ¼ inches.
2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
3. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability

factor to 25 percent to allow expansion and contraction of piping system from base support.

P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

Q. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION

SECTION 23 05 48 - VIBRATION ISOLATION

PART 1 - GENERAL

**NOTE: CONTRACTOR IS TO FURNISH AND INSTALL A VIBRATION ISOLATING DEVICE ON ALL MACHINE, MOTOR, AND CIRCULATING PIECES OF EQUIPMENT.
IF A VIBRATION ISOLATING DEVICE IS OMITTED FROM THE DRAWINGS, THE CONTRACTOR IS TO MAKE AN ALLOWANCE TO INSTALL ONE.**

1.01 REFERENCE

A. Refer to section 23 05 00 for requirements which are applicable to this section.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to select, provide, and install vibration isolation devices as described herein and required for equipment on the project.

1.03 SUBMITTALS

A. Submit shop drawings of all isolators, rails, hangers, mountings, connectors, hoses, and anchors specified herein.

1.04 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's warranty requirements.
B. Install equipment in accordance with manufacturer’s instructions.

PART 2 - PRODUCTS

2.01 SPRING MOUNTINGS

A. Spring type isolators shall be free standing and laterally stable without any housing and complete with 1/4" neoprene acoustical friction pads between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height.
B. Mountings shall be type SLF as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.
C. Application: Base mounted pumps not slab on grade and less than 5 Hp, base mounted pumps slab on grade 7 ½ HP and up. Air handling units not slab on grade, ATC compressors not slab on grade and less than 5 Hp. Roof mounted condensing units over 5 tons cooling capacity.

2.02 PRE-COMPRESSED SPRING AND NEOPRENE HANGERS

A. Vibration hangers shall be spring and neoprene as described above, but they shall be pre-compressed to the rated deflection so as to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale.
B. Hangers shall be type PC3ON as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.
C. Application: Horizontal fan/coil units above 5 ton capacity.

2.03 DUCT HANGERS

A. Vibration hangers shall contain a steel spring located in a neoprene cup manufactured with a grommet to prevent a short circuiting of the hanger rod. The cup shall contain a steel washer designed to properly distribute the load on the neoprene and prevent its extrusion. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 degree arc before contacting the hole and short circuiting the spring. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Hangers shall be provided with an eye bolt on the spring end and provision to attach the housing to the flat iron duct straps. Submittals shall include a scale drawing of the hanger showing the 30 degree capability.
B. Hangers shall be type W30 as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.
C. Application: Ductwork in mechanical rooms below occupied spaces.

2.04 FLOATING CONCRETE BASES

A. Vibration isolator manufacturer shall furnish rectangular structural beam or channel concrete forms for floating foundations. Bases for split case pumps shall be large enough to provide support for suction and discharge base ells. The base depth need not exceed 12" unless specifically recommended by the base manufacturer for mass or rigidity. In general, bases shall be a minimum of 1/12th of the longest dimension of the base, but not less than 6". Forms shall include minimum concrete reinforcement consisting of half-inch bars or angles welded in pa\lace on 6" centers running both ways in a layer 1 1/2" above the bottom, or additional steel as is required by the structural conditions. Forms shall be furnished with drilled steel members with sleeves welded below the holes to receive equipment anchor bolts where the anchor bolts fall in concrete locations. Height saving brackets shall be employed in all mounting locations. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base.
B. Bases shall be type K as manufactured by Mason Industries, Inc. or equivalent by Vibration Eliminator Company or Amber Booth.
C. Application: Centrifugal pumps over 5 Hp and not slab on grade.

2.05 ROOF CURB BASES

A. Curb mounted rooftop equipment shall be mounted on vibration isolation bases that fit over the roof curb and under the isolated equipment. The extruded aluminum top members shall overlap the bottom member to provide water runoff independent of the seal. The aluminum member shall house cadmium plated springs having a 1-inch minimum deflection with 50% addition travel to solid. Spring diameters shall be no less than 0.8 of the spring height at rated load. Wind resistance shall be provided by means of resilient snubbers in the corners with a minimum clearance of 1/4" so as

not to interfere with the spring action except in high winds. The weather seal shall consist of continuous closed cell sponge materials both above and below the base and a waterproof flexible duct like connection joining the outside perimeter of the aluminum members. Foam or other contact like seals are unacceptable at the spring cavity closure. Caulking shall be kept to a minimum.

B. Curb mounted bases shall be type CMAB as manufactured by Mason Industries or equivalent by Vibration Eliminator Company, Amber Booth, Thi-Curb, Custom Curb or R.P.S.

C. Application: Roof mounted A/C units, air handling units and separated condensing units.

2.06 PIPE HANGERS

A. Combination neoprene and spring with 1" static deflection.

B. Application: Pipe hangers in boiler or mechanical room under occupied space.

PART 3 - EXECUTION

3.01 PRECOMPRESSED SPRING AND NEOPRENE HANGERS

A. Hangers shall have a maximum rated deflection of 1.18" for equipment 20 lbs. and under and 1.75" for equipment over 20 lbs.

B. Average neoprene deflection shall be between 0.35" and 0.4".

3.02 DUCT HANGERS

A. Hangers shall have a maximum rated deflection of 1.18" for equipment 95 lbs. and under and 1.35" for equipment over 95 lbs.

3.03 FLOATING CONCRETE BASES

A. Select the appropriate base to match the equipment that is being provided. Base shall meet the exact dimensional and weight requirements at all points of equipment.

B. Install as recommended by the vibration isolator manufacturer.

3.04 ROOF CURB BASES

A. Select the appropriate base to match the equipment being provided. Base shall meet the exact dimensional and weight requirements at all points of the curb. Install as recommended by the vibration isolator manufacturer.

B. Adjust, place in service, and provide instructions.

END OF SECTION

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Balancing Air Systems:
      a. Constant-volume air systems.

1.02 DEFINITIONS

A. AABC: Associated Air Balance Council.
B. NEBB: National Environmental Balancing Bureau.
C. TAB: Testing, adjusting, and balancing.
D. TABB: Testing, Adjusting, and Balancing Bureau.
E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
F. TDH: Total dynamic head.

1.03 ACTION SUBMITTALS

A. LEED Submittals:
   1. Air-Balance Report for Prerequisite IEQ 1: Documentation indicating that work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
   2. TAB Report for Prerequisite EA 2: Documentation indicating that work complies with ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.04 INFORMATIONAL SUBMITTALS

A. Strategies and Procedures Plan: Within [30] [60] [90] <Insert number> days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
B. Certified TAB reports.

1.05 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by AABC or NEBB.
   1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC or NEBB.
   2. TAB Technician: Employee of the TAB specialist and certified by AABC or NEBB as a TAB technician.
B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
C. Examine the approved submittals for HVAC systems and equipment.
D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
F. Examine equipment performance data including fan and pump curves.
    1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
    2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
H. Examine test reports specified in individual system and equipment Sections.
I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
N. Examine system pumps to ensure absence of entrained air in the suction piping.
O. Examine operating safety interlocks and controls on HVAC equipment.
P. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
   1. Airside:
      a. Duct systems are complete with terminals installed.
      b. Volume, smoke, and fire dampers are open and functional.
      c. Clean filters are installed.
      d. Fans are operating, free of vibration, and rotating in correct direction.
      e. Variable-frequency controllers' startup is complete, and safeties are verified.
      f. Automatic temperature-control systems are operational.
      g. Ceilings are installed.
      h. Windows and doors are installed.
      i. Suitable access to balancing devices and equipment is provided.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
   1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
   2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233700 "Air Duct Accessories."
   3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230700 "Duct Insulation," Section 230700 "HVAC Equipment Insulation," and Section 230700 "HVAC Piping Insulation."
C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
B. Prepare schematic diagrams of systems' "as-built" duct layouts.
C. For variable-air-volume systems, develop a plan to simulate diversity.
D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
G. Verify that motor starters are equipped with properly sized thermal protection.
H. Check dampers for proper position to achieve desired airflow path.
I. Check for airflow blockages.
J. Check condensate drains for proper connections and functioning.
K. Check for proper sealing of air-handling-unit components.
L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

M. The contractor shall allow for (2) passes for each heating and cooling season.
N. Allow for one sheave change for 50% of the HVAC systems to be tested and adjusted. Replacement sheave shall be furnished and installed by the mechanical contractor. Sheave shall be adjusted by the TBA contractor.

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
   1. Measure total airflow.
      a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
      b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
      c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
      d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
   2. Measure fan static pressures as follows:
      a. Measure static pressure directly at the fan outlet or through the flexible connection.
      b. Measure static pressure directly at the fan inlet or through the flexible connection.
      c. Measure static pressure across each component that makes up the air-handling system.
      d. Report artificial loading of filters at the time static pressures are measured.
   3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
   4. Obtain approval from Owner for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
   5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
   1. Measure airflow of submain and branch ducts.
   2. Adjust submain and branch duct volume dampers for specified airflow.
   3. Re-measure each submain and branch duct after all have been adjusted.
C. Adjust air inlets and outlets for each space to indicated airflows.
   1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
   2. Measure inlets and outlets airflow.
   3. Adjust each inlet and outlet for specified airflow.
   4. Re-measure each inlet and outlet after they have been adjusted.

3.06 DUCTWORK LEAKAGE TESTING

A. Installed ductwork shall be tested prior to installation of access doors, take-offs, etc.
B. All leak testing shall be witnessed by the engineer or representative of the engineer. The contractor shall give the engineer 72 hours' notice prior to testing. Any testing not witnessed by the engineer or

his/her representative shall be considered invalid and will be redone.

C. The testing shall be performed as follows:
   1. Perform testing in accordance with HVAC Air Duct Leakage Test Manual.
   2. Use a certified orifice tube for measuring the leakage.
   3. Determine section of system to be tested and blank off.
   4. Determine the percentage of the system being tested.
   5. Using that percentage, determine the allowable leakage (cfm) for that section being tested.
   6. Pressurize to operating pressure and repair any significant or audible leaks.
   7. Repressurize the measure leakage.
   8. Repeat steps 6 and 7 until the leakage measured is less than the allowable defined in step 5.

   NOTE: It is recommended that the first 100'-300' of ductwork installed be tested to insure the quality of the workmanship at an early stage.

3.07 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
   1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
   2. Air Outlets and Inlets: Plus or minus 10 percent.
   3. Heating-Water Flow Rate: Plus or minus 10 percent.
   4. Cooling-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.08 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
   1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
   2. Include a list of instruments used for procedures, along with proof of calibration.
   3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:
   1. Pump curves.
   2. Fan curves.
   3. Manufacturers' test data.
   4. Field test reports prepared by system and equipment installers.
   5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:
   1. Title page.
   2. Name and address of the TAB specialist.
   3. Project name.
   4. Project location.
   5. Architect's name and address.
   6. Engineer's name and address.
   7. Contractor's name and address.
   8. Report date.
   9. Signature of TAB supervisor who certifies the report.
   10. Table of Contents with the total number of pages defined for each section of the report.

Number each page in the report.

11. Summary of contents including the following:
    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:
    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.
    i. Center-to-center dimensions of sheave and amount of adjustments in inches.
    j. Number, make, and size of belts.
    k. Number, type, and size of filters.
2. Motor Data:
    a. Motor make, and frame type and size.
    b. Horsepower and rpm.
    c. Volts, phase, and hertz.
    d. Full-load amperage and service factor.
    e. Sheave make, size in inches, and bore.
    f. Center-to-center dimensions of sheave and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
    a. Total airflow rate in cfm.
    b. Total system static pressure in inches wg.
    c. Fan rpm.

d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Preheat-coil static-pressure differential in inches wg.
g. Cooling-coil static-pressure differential in inches wg.
h. Heating-coil static-pressure differential in inches wg.
i. Outdoor airflow in cfm.
j. Return airflow in cfm.
k. Outdoor-air damper position.
l. Return-air damper position.
m. Vortex damper position.

F. Air-Terminal-Device Reports:
1. Unit Data:
a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.
2. Test Data (Indicated and Actual Values):
a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg. F.

G. System-Coil Reports: For reheat coils of terminal units, include the following:
1. Unit Data:
a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.
2. Test Data (Indicated and Actual Values):
a. Airflow rate in cfm.
b. Entering-air temperature in deg. F.
c. Leaving-air temperature in deg. F.

H. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
1. Unit Data:
a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Pump rpm.
g. Impeller diameter in inches.

h. Motor make and frame size.
i. Motor horsepower and rpm.
j. Voltage at each connection.
k. Amperage for each phase.
l. Full-load amperage and service factor.
m. Seal type.

2. Test Data (Indicated and Actual Values):
a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

I. Instrument Calibration Reports:
1. Report Data:
a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.09 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner.
B. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
E. If TAB work fails, proceed as follows:
1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
3. If the second verification also fails, Owner may contact AABC Headquarters regarding the AABC National Performance Guaranty.
F. Prepare test and inspection reports.

3.10 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes insulating the following duct services:
   1. Indoor, concealed supply air.
B. Related Sections:
   1. Section 230716 "HVAC Equipment Insulation."
   2. Section 230719 "HVAC Piping Insulation."
   3. Section 233113 "Metal Ducts" for duct liners.
C. Insulation to be in accordance with ASHRAE 90.1-2016.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Sustainable Design Submittals:
   1. For each type of insulation product indicated, include thermal conductivity, water-vapor permeability for closed cell insulations, thickness, applicable ASTM standard specification, and jackets (both factory- and field-applied, if any). For each type of vapor retarder or jacket specified, include water vapor permeability, required thickness, and applicable ASTM standard specification.
   2. Product Data: For adhesives, indicating VOC content.
   3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
   4. Product Data: For coatings, indicating VOC content.
   5. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
   6. Product Data: For sealants, indicating VOC content.
   7. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
   8. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components. Laboratory Test Reports for Credit EQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.
C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Detail insulation application at elbows, fittings, dampers, specialties, and flanges for each type of insulation.
   3. Detail application of field-applied jackets.
   4. Detail application at linkages of control devices.

1.03 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.04 QUALITY ASSURANCE

A. Install insulation in accordance with the manufacturer's instructions.

Material Certifications: Manufacturers can provide information regarding material and testing certifications from a qualified testing agency acceptable to authorities having jurisdiction (AHJ). The AHJ can use this information for indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. (Many companies published compliance data on public data sheets while also offering technical resources for additional information. The wording was adjusted to reflect this.)

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency. Suggestion: or proper documentation indicating compliance. (Some fabricated materials used by the industry do not come directly from the manufacturer, so this documentation can be provided in those cases).
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871. Products that come in contact with austenitic stainless steel operating at temperatures between 140°F and 250°F shall have a leachable chloride content in accordance with the limits set by ASTM C795 (Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel).
D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795. See above.
E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, [Type I] Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. CertainTeed Corporation.
      b. Johns Manville; a Berkshire Hathaway company.
      c. Knauf Insulation.

d. Manson Insulation Inc.
e. Owens Corning.

G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. CertainTeed Corporation.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Manson Insulation Inc.
e. Owens Corning.

2.02 FIRE-RATED INSULATION SYSTEMS

A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a [1] [2]-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. 3M.
b. CertainTeed Corporation.

2.03 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.
2. Fiberglass adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Childers Brand; H. B. Fuller Construction Products.
b. Eagle Bridges - Marathon Industries.
c. Foster Brand; H. B. Fuller Construction Products.
d. Mon-Eco Industries, Inc.
2. Adhesive shall have a VOC content of 80 g/L or less (if available) when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California

Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. PVC Jacket Adhesive: Compatible with PVC jacket.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Dow Corning Corporation.
      b. Johns Manville; a Berkshire Hathaway company.
      c. P.I.C. Plastics, Inc.
      d. Speedline Corporation.
   2. Adhesive shall have a VOC content of 80 g/L or less (if available) when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.04 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
   1. VOC Content: 420 g/L or less.
   2. Low-Emitting Materials: Mastic coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Foster Brand; H. B. Fuller Construction Products.
      b. Knauf Insulation.
      c. Vimasco Corporation.
   2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 deg. F.
   4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
   5. Color: White.

2.05 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Childers Brand; H. B. Fuller Construction Products.
      b. Eagle Bridges - Marathon Industries.
      c. Foster Brand; H. B. Fuller Construction Products.
      d. Mon-Eco Industries, Inc.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250° F.
   5. Color: Aluminum.
   6. Sealant shall have a VOC content of 420 g/L or less.

7. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Childers Brand; H. B. Fuller Construction Products.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250° F.
5. Color: White.
6. Sealant shall have a VOC content of 420 g/L or less.
7. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.06 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.

B. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.07 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Childers Brand; H. B. Fuller Construction Products.

2.08 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White

D. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Childers Brand; H. B. Fuller Construction Products.
b. ITW Insulation Systems; Illinois Tool Works, Inc. Johns Manville
c. RPR Products, Inc.
2. Factory cut and rolled to size.
3. Finish and thickness are indicated in field-applied jacket schedules.
4. Moisture Barrier for Indoor Applications: 1-mil-thick, heat-bonded polyethylene and kraft paper.

E. Self-Adhesive Outdoor Jacket: 6014-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross laminated polyethylene film covered with stucco-embossed aluminum-foil facing.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
a. Polyguard Products, Inc.
b. VentureClad by 3M

2.09 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Avery Dennison Corporation, Specialty Tapes Division.
b. Compac Corporation.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Venture Tape.
2. Width: 3 inches
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces' force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Avery Dennison Corporation, Specialty Tapes Division.
b. Compac Corporation.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Venture Tape.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces' force/inch in width.
5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Avery Dennison Corporation, Specialty Tapes Division.
b. Compac Corporation.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.
e. Venture Tape.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces' force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

A. Aluminum Bands: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. ITW Insulation Systems; Illinois Tool Works, Inc.
b. RPR Products, Inc.

B. Insulation Pins and Hangers:
1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) AGM Industries, Inc.
2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.
5) Nelson Stud Welding.
b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
c. Spindle: Aluminum, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1) Gemco.

2) Midwest Fasteners, Inc.

b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1 ½ inches in diameter.

c. Spindle: Nylon, 0.106-inch-diameter shank, length to suit depth of insulation indicated, up to 2 ½ inches.

d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.

3. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.

b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

c. Spindle: Aluminum, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.

d. Adhesive-backed base with a peel-off protective cover.

4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, aluminum sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1 ½ inches in diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.
5) Nelson Stud Welding.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

c. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1 ½ inches in diameter.

d. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Gemco.
2) Midwest Fasteners, Inc.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

D. Wire: 0.062-inch soft-annealed, galvanized steel.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. C & F Wire.

2.11 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
E. Install multiple layers of insulation with longitudinal and end seams staggered.
F. Keep insulation materials dry during storage, application, and finishing.
G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
H. Install insulation with least number of joints practical.
I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
    1. Install insulation continuously through hangers and around anchor attachments.
    2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
    3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
K. Install insulation with factory-applied jackets as follows:
    1. Draw jacket tight and smooth.
    2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
    3. Overlap jacket longitudinal seams at least 1 ½ inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
        a. For below ambient services, apply vapor-barrier mastic over staples.
    4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
    5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal

thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.03 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
   1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
   2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
   3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
      a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches' maximum from insulation end joints, and 16 inches o.c.
      b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches' maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
      c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
      d. Do not over compress insulation during installation.
      e. Impale insulation over pins and attach speed washers.
      f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
   4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
      a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
      b. Install vapor stops for ductwork and plenums operating below 50 deg. F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
   5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
   6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
   7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive tape, or insulation pins.

Follow manufacturer’s installation instructions.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not over compress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1-inch o.c. Install vapor barrier consisting of factory or field applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50°F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.04 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:
    1. Draw jacket material smooth and tight.
    2. Install lap or joint strips with same material as jacket.
    3. Secure jacket to insulation with manufacturer's recommended adhesive.
    4. Install jacket with 1 ½ -inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
    5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
B. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for

horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.05 FIRE-RATED INSULATION SYSTEM INSTALLATION

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
B. Insulate duct access panels and doors to achieve same fire rating as duct.
C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.06 FINISHES

A. Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
   1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
      a. Finish Coat Material: Interior, flat, latex-emulsion size.
B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
C. Do not field paint aluminum or stainless-steel jackets.
D. Local building code and fire marshal shall approve before painting.

3.07 FIELD QUALITY CONTROL

A. Perform tests and inspections. Engage a qualified testing agency to perform tests and inspections.
B. Tests and Inspections:
   1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.08 DUCT INSULATION SCHEDULE, GENERAL

A. Ducts Requiring Insulation:
   1. Indoor, concealed supply.
B. Items Not Insulated:
   1. Fibrous-glass ducts.
   2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
   3. Factory-insulated flexible ducts.
   4. Factory-insulated plenums and casings.

5. Flexible connectors.
6. Vibration-control devices.
7. Factory-insulated access panels and doors.

3.09 INDOOR DUCT INSULATION SCHEDULE

A. Concealed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 0.75-lb/cu. Ft. nominal density. “R” value of 4.2.
B. Concealed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 2 inches thick and 0.75-lb/cu. Ft nominal density. “R” value of 4.2.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
B. If more than one material is listed, selection from materials listed is Contractor's option.
C. Ducts and Plenums, Concealed:
   1. None.
   2. Aluminum, Smooth, Corrugated Stucco Embossed.

END OF SECTION

SECTION 23 09 33 - AUTOMATIC TEMPERATURE CONTROL – (CONNECT TO EXISTING BAS)

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to section 23 05 00 for requirements which are applicable to this section.
B. Refer to International Mechanical Code.
C. Refer to National Electrical Code.

1.02 GENERAL NOTES

A. The mechanical contractor shall retain the existing ATC sub-contractor to furnish all labor, materials, equipment, and service necessary for a complete and operating BAS, utilizing direct digital controls as shown on the drawings and described herein. The existing building BAS shall be connected to this building and provide standalone access using a standard web browser; HVAC system control, energy management, alarming, monitoring, trending and reporting functions with operator interface. The BAS shall include a web-based operator interface depict each mechanical system and building floor plan by a point-and-click graphic. The web server shall reside on the building owner's network and shall be provided with an IP address by the owner. The web server shall gather data from the mechanical systems and generate web pages accessible through a conventional web browser on each pc connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
B. The BAS system shall provide:
    1. Stand-alone independent control for all mechanical systems as described in the sections that follow.
    2. Complete energy management software and firmware that resides and executes in networked field controllers. Operator workstation software shall not be utilized for energy management execution.
    3. Alarm management capability for all mechanical equipment described in the sections that follow – including alarm occurrence, annunciation, remote dial-out to remote sites or pagers, acknowledgement, problem diagnostics, and reporting functions.
    4. Complete password protected system monitoring through a local networked operator workstation, or through remote operator workstations. Remote workstations shall utilize telephone or internet or ethernet communications links, as required.
    5. Standard and customized manual or automatic reports of trends, runtimes, consumables, alarms, and system operator activities.
    6. The Mechanical Contractor shall submit equipment submittals of all mechanical equipment to the ATC Contractor for review prior to ordering the equipment.
    7. All ATC wiring, components and installation shall comply with the national electric code.
    8. ATC contractor shall utilize low voltage conductors (solid or stranded) of the appropriate gauge and approved by the thermostat manufacturer.
C. Existing BAS Manufacturer
    1. Honeywell.

1.03 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to install a complete, functioning, Automatic Temperature Control (ATC) system.
B. Power wiring will be provided under the Electrical portion of the work.
C. Control wiring shall be furnished under this portion of the work. Control wiring is line voltage or low voltage if it performs as control wiring. Power for operation of valves and dampers is considered control wiring.
D. ATC contractor/mechanical contractor to arrange for power for control equipment with electrical contractor. Allow for compensation to the electrical contractor to install a power source which may be required.
E. The mechanical contractor shall be responsible for the complete coordination of all parts of the ATC system whether they be part of packaged control systems within units or built up systems by ATC providers. It is the intent that all systems and subsystems to be coordinated and to be provided to produce the following sequences described in this specification.
F. All control wiring shall be CAT 6 plenum rated. All control wiring shall run concealed in finished spaces. Control wiring to be in conduit in exposed interior unfinished areas and where subject to damage. All exterior exposed control wiring to be in conduit and weather protected. Conduit to be (EMT).
G. ATC contractor to be present at equipment/system start-up and verify that all wiring and components are installed correctly and the equipment/system sequence of operation is operating as designed. ATC contractor to perform final calibrations of all devices and equipment. ATC contractor to make all the required corrections if the equipment/system does not operate correctly.
H. ATC contractor to coordinate with the test, balancing, and adjusting (TBA) contractor prior to performing equipment/systems tests that all air and steam systems have been tested and balanced.

1.04 SUBMITTALS

A. Submit shop drawings of all components.
B. Submit manufacturers' data sheets of valve Cv performance.
C. Submit design data and sequence of operations descriptions for all systems.
D. Submit wiring diagrams of electrical or electronic control systems.
E. At the completion of the project, submit final “as-built” drawings/CAD disk, all associated component/equipment cut-sheets/submittals, wiring diagrams, and final/actual sequence of operations descriptions of each system. Include ATC emergency contact information.

1.05 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's warranty requirements.
B. Work shall be performed by skilled tradesmen normally engaged in the control systems trade.

PART 2 - PRODUCTS

2.01 CONTROL DEVICES - GENERAL

A. All control devices and products used in the control system shall be first-line products, manufactured for the application as used.
B. All thermostats shall have guards. Thermostat guards shall be plastic or metal covers to prevent

tampering with the instrument. Provide substantial, locked, opaque cover, hinged to a base which is secured to the wall, not to the thermostat base.

C. Control valves for fluids shall be two-position (On-Off), modulating two-position, three-way, or modulating three-way (mixing or diverter), as required for the application. Modulating valves shall be selected with the proper flow characteristics to allow control of the flow over as wide a range as is possible with a reasonable maximum pressure drop (7 ft.) of water unless noted otherwise.

2.02 CONTROL DEVICES - ELECTRICAL

A. All electrical wiring for the control system shall be as specified in this section and the Electrical Section of the Specifications and as required by local codes. The wiring shall be by this contractor.

B. All thermostats to be 24hr./7 day programmable type, auto changeover type, +/-3 degree adjustment capability (when integrated with building automation system), WIFI capability. Manufacturer: Honeywell. Provide locking cover (clear plastic, hinged type).

2.03 ACCEPTABLE MANUFACTURERS

A. Control equipment shall be manufactured by a company regularly engaged in production of this type of equipment, as shown on the drawings, or equivalent equipment by Honeywell, Johnson Controls, Alerton, Schneider Electric, Delta, or prior approved equals.

2.04 DAMPER AND VALVE ACTUATORS

A. All damper actuators (motors) installed in conjunction with an Air Handler/HVAC unit must be of the spring return, 2 position, occupied/unoccupied type, or modulating where an economizer cycle is required.

B. Combustion air damper actuators shall be of the 2 position, spring return type.

2.05 RELAYS AND SIGNAL TRANSMITTERS

A. All necessary relays, contacts, and interface devices shall be furnished to make the system a full and operable system.

2.06 CONTROL VALVES

A. Hot water control valves shall be of the two-way or three-way, type as indicated with modulating plug, and spring return. Three-point floating type modulation, 0-10vdc or 4-20madc are acceptable. All heating valves shall fail to the open position upon a loss of power.

B. Modulating valves shall be selected with the proper flow characteristics to allow control of the flow over as wide a range as is possible with a reasonable maximum pressure drop (7 ft) of water unless noted otherwise.

C. Valves are to be manufactured by Honeywell, Johnson Controls, Powers, Barber Colman or approved equal.

2.07 DUCT SMOKE DETECTORS

A. Duct smoke detectors shall be of the photo-electronic type with sampling tube of ample length to traverse the entire width of the duct. Duct smoke detectors shall be manufactured by the control companies, the fire alarm companies, B.R.K. Electronics or approved equal. All HVAC units of 2000 CFM or more shall have duct smoke detectors in both the supply and return air streams. A single

duct smoke detection in the return air stream shall be provided only when acceptable to the local authority having jurisdiction.

B. Duct smoke detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.

C. Units of 15,000 CFM or more shall have two detectors. (supply and return air)

D. Furnish and install where indicated on the drawings or required elsewhere in the specifications air duct smoke detectors. They shall integrate photoelectric, ionization and heat sensing technologies for optimum detection accuracy and to prevent unwanted alarms. Auxiliary contacts shall be provided to shut down the air handling unit fan. The detector shall output to a remote alarm indicator.

E. Duct smoke detectors to be furnished by the (mechanical contractor/electrical contractor).

F. Duct smoke detectors shall be installed by the mechanical contractor.

G. Interconnection between the duct smoke detectors and fire alarm system shall be performed by the electrical contractor/fire alarm contractor.

H. Control's integration to shut down the HVAC equipment in alarm shall be performed by the mechanical contractor/ATC contractor.

2.08 FREEZESTATS

A. The freezestat shall be of the vapor pressure type with a 20 foot minimum element. Element shall respond to the lowest temperature sensed by any one foot section.

B. The freezestat shall be manual reset. Provide reset button and red indicator light. Location to be coordinated with architect.

C. All coils (heating hot water, chilled water, condenser water/water source) with outside air and hot water in ducts or units shall have freezestats.

2.09 MOTOR OPERATED DAMPERS

A. The motor operated dampers shall be of the parallel blade type for all 2-position applications such as the combustion air dampers and of the opposed blade type for all modulating applications including the outside air dampers for the heating, air conditioning, and ventilating units.

B. The damper frames shall be extruded aluminum not less than, 08" thick, thermally broken, roll-formed channel with prepunched slotted mounting holes. The damper blades shall be extruded aluminum insulated R-2.29.

C. Bearings shall be composed of a Celcon inner bearing with aluminum hexagon blade pivot pin, rotating within a poly carbonate outer bearing inserted in the frame. The dampers shall be equal to Tamco series 9000 ECT for parallel blade dampers and for opposed blade dampers.

D. Dampers shall have a closed leakage rate of not more than 1.4 CFM per sq. ft. for 3'x3' damper at 1" S.P leakage class 1A.

2.10 DIFFERENTIAL PRESSURE SWITCH

A. Differential pressure switches shall have adjustable set point and differential and be of the automatic reset, snap acting type as manufactured by Honeywell or approved equal.

B. +/- 5% accuracy, -1 to +1" P.G.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All control equipment shall be installed as recommended by the manufacturer and as required for service in the field. No equipment shall be concealed or covered by other equipment unless adequate provisions are made for service and replacement.
B. All wiring shall be run in neat, straight lines to present a finished appearance. Multiple runs shall be supported on brackets and spaced to give access to each line. Any work not neatly installed shall be removed and replaced.
C. All wires shall be color-coded and numbered on both ends of each conductor for easy identification. Colors and numbers shall not change in the middle of a run, unless an accessible junction box is provided. Provide numbered terminal strips in all control panels.
D. Wiring diagrams shall be prepared for all electrical connections, showing the actual wire number and terminal identification as installed. No less than three copies of such diagrams shall be delivered to the engineer as-built drawings.
E. Installation of all equipment shall be made by qualified mechanics familiar with control systems, forces involved, and their operation.
F. All connections shall be made by technicians who are familiar with the operation of the equipment and the intent of the control designer.
G. After all equipment is mounted and connected, the control engineer shall inspect the system and verify the correct operation and connection of all equipment. Any equipment found to be installed improperly or connected incorrectly shall be changed as required. After the system is installed correctly, all instruments shall be calibrated and set points fixed at the correct setting.

3.02 TESTING/TRAINING

A. At the time of final review, the control contractor shall instruct the owner in the proper operation and maintenance of the system as installed and demonstrate how the system is designed to perform.
B. At completion of the training, the contractor shall submit a letter stating the owner has received proper training, date, time, and location of training and name of the trainee.
C. Any system found to be out of calibration or functioning improperly at this time shall be corrected immediately and the correct functions of the entire system demonstrated to the satisfaction of the engineer.
D. The ATC contractor shall provide two training sessions for systems orientation, product maintenance, trouble shooting, and emergency contacts. ATC contractor to coordinate with owner/architect/engineer to determine representatives/designated staff to be present for the training. ATC contractor to provide one training session during the heating (winter) season and one during the cooling (summer) season.

3.03 WARRANTY PERIOD SERVICES

A. Equipment, materials, and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance by owner.
B. Within this period, upon notice by the Owner, any defects in the BAS due to faulty materials, methods of installation or workmanship shall be promptly repaired or replaced by the ATC Contractor at no expense to the Owner.
C. The ATC Contractor shall inspect, repair, replace, adjust, and calibrate, as required, the controllers, control devices and associated peripheral units during the warranty period. The ATC Contractor shall then furnish a report describing the status of the equipment, problem areas (if any) noticed during service work and description of the corrective actions taken. The report shall clearly certify that all systems/equipment are functioning correctly.

D. Service Period: Calls for service by the Owner shall be honored within 24 hours and are not to be considered as part of routine maintenance.
E. Service Documentation: A copy of the service report associated with each owner-initiated service call shall be provided to the owner.

PART 4 - SEQUENCE OF OPERATIONS

4.01 SPLIT SYSTEM HEAT PUMPS WITH AUXILIARY HEAT

A. General
   1. Air Handling Unit (AHU) shall be provided with a wall mounted two-stage heat programmable 24 hr./ 7-day thermostat with occupied/unoccupied scheduling and independent emergency heat operation.
   2. ATC contractor shall install and wire thermostat. Confirm final location with architect prior to rough-in.
   3. ATC contractor shall coordinate set points with owner.
   4. ATC contractor shall mount and wire condensate overflow switch.
   5. Split system heat pump shall be provided with an open protocol BACNET controller.
   6. Occupied/Unoccupied shall be determined by the BAS time clock.
B. Operation (occupied mode)
   1. Cooling - on a call for cooling, the unit shall operate to maintain 72ºF (adj.).
   2. Heating - on a call for heating, the thermostat shall enable the unit's first stage of heat (heat pump) operate to maintain 70ºF (adj.). If the first stage of heat is unable to achieve the space temperature setpoint, the unit shall disable compressorized heating and enable the second stage of heat (electric heat). Simultaneous compressorized heating and electric heating shall be prohibited. The thermostat shall allow for the occupant to manually select the emergency heat position.
   3. The condensate overflow switch mounted in the cooling coil drain pan shall deengerize the unit whenever enabled. Unit shall be manually restarted.
C. Operation (unoccupied mode)
   1. Cooling - on a call for cooling, the unit shall operate to maintain 78ºF (adj.).
   2. Heating - on a call for heating, the thermostat shall enable the unit's first stage of heat (heat pump) operate to maintain 65ºF (adj.). If the first stage of heat is unable to achieve the space temperature setpoint, the unit shall disable compressorized heating and enable the second stage of heat (electric heat). Simultaneous compressorized heating and electric heating shall be prohibited. The thermostat shall allow for the occupant to manually select the emergency heat position.
   3. The condensate overflow switch mounted in the cooling coil drain pan shall disable the unit whenever enabled. Unit must be manually restarted.
D. Provide a duct smoke detector in each unit 2,000 CFM or over in the return air connection and in the supply air ductwork.
E. Fire alarm shutdown – If the duct smoke detectors sense smoke, then the associated unit shall be de-energized. The unit shall not be permitted to operate until all trouble signals are cleared on the fire alarm system.
F. Ventilation air - during occupied hours, the outside air damper shall be open. During the evening hours and unoccupied hours, the outside air damper shall be closed unless unoccupied cooling can

be achieved via economizer.

G. Integrate with the BAS.

4.02 SPLIT SYSTEM DX COOLING WITH INTEGRAL STEAM COILS

A. Air handling units have integral steam coils. The control valve (2 position) shall be reset from a duct mounted submaster thermostat downstream of the heating coil.
B. The programmable thermostat shall be an auto-changeover type which when indexed to the occupied cycle by BAS shall energize the system and open the outside air damper (to its minimum position) when the return air temperature is within 5 ° of design space temperature.
C. On a rise in space temperature above the thermostat setpoint the DX system shall be energized. On a fall in space temperature the DX system shall be de-energized.
D. On a continued fall in space temperature the wall thermostat shall gradually reset the duct mounted thermostat up. The submaster shall gradually open the steam control valve to pass more steam through the coil until space temperatures are satisfied.
E. During unoccupied cycle and evening hours, the outside air damper shall be closed.
F. The condensate overflow switch mounted in the cooling coil drain pan and secondary drain pan shall de-energized the unit whenever enabled. Unit shall be manually restarted.
G. Provide a duct smoke detector in each unit 2,000 CFM or over in the return air connection and in the supply air ductwork.
H. Fire alarm shutdown – If the duct smoke detectors sense smoke, then any combination fire/smoke dampers shall close and the associated unit shall be de-energized. The unit shall not be permitted to operate until all trouble signals are cleared on the fire alarm system.
I. Ventilation air - during occupied hours, the outside air damper shall be open. During the evening hours and unoccupied hours, the outside air damper shall be closed unless unoccupied cooling can be achieved via economizer.
J. The freezestat shall be wired with the fan starter. Whenever the air temperature upstream of the coils is 36°F, the fan shall stop, the outside air damper shall close and the chilled water and heating water valves shall open. A manual reset shall return the unit to normal operation.
K. The split system and associated hot water coil control valve shall be with an open protocol BACNET controller.
L. Integrate with the BAS.

4.03 FREEZESTATS

A. All units with steam coils within the units or duct mounted heating hot water coils shall have averaging freezestats on the leaving side of the water coil.
B. Whenever the air temperature upstream of the water coil is 36°F, the fan shall stop, the outside air damper shall close, the return air damper (if required) shall fully open, and the water valves shall open. A manual reset shall return the unit to normal operation.
C. The unit shall be de-energized, the outside air damper shall close, the return air damper (if required) shall fully open, and the hot water control valve shall fully open, if the freezestat falls below 36°F (adj) degrees.
D. Applies to air handling units with steam coils, and outside air.
E. Integrate with the BAS.

4.04 DUCT MOUNTED SMOKE DETECTORS

A. In air systems with a capacity greater than 2,000 CFM, furnish and install duct mounted smoke detectors in the supply air (downstream the air filters and upstream of any branch duct) and return

air ductwork.

B. The fire alarm sub-contractor shall furnish a fire alarm monitoring module for each required air handling system. The ATC Contractor shall wire the fire alarm monitoring module to the emergency shutdown contacts or combination motor starter/disconnect on each air handling system.

C. Detectors shall de-energize the unit and signal the addressable fire alarm system if smoke is detected.

D. Detectors shall be accessible. Mechanical contractor shall be responsible for providing all necessary access panels and doors.

E. Duct smoke detectors to be furnished by the Electrical/ Mechanical Contractor.

F. Integrate with the BAS.

END OF SECTION

SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Rectangular ducts and fittings.
   2. Round ducts and fittings.
   3. Sheet metal materials.
   4. Sealants and gaskets.
   5. Hangers and supports.

B. Related Sections:
   1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
   2. Section 233116 "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
   3. Section 233119 "HVAC Casings" for factory and field fabricated casings for mechanical equipment.
   4. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.02 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule” Article.

B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ANSI/ASHRAE 62.1.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Submittals:
   1. Product Data: For ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
   2. Product Data: For adhesives, indicating VOC content.
   3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
   4. Product Data: For sealants, indicating VOC content.
   5. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:
   1. Ductwork shop drawings must be properly submitted. Any ductwork installed without prior approval by the engineer and found to be incorrect, shall be replaced at the expense of the contractor.

2. Submit shop drawings of all sheet metal for review. Drawings shall be not less than 1/4" scale and show all light fixtures, steel, piping, conduit, equipment and architectural features. It is unacceptable to resubmit and modify McHugh design documents for sheet metal drawing purposes.
   a. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   b. Factory- and shop-fabricated ducts and fittings.
   c. Duct layout indicating sizes, configuration, and static-pressure classes.
   d. Elevation of top of ducts. Verify ductwork fits in available space.
   e. Dimensions of main duct runs from building grid lines.
   f. Fittings.
   g. Reinforcement and spacing.
   h. Seam and joint construction.
   i. Penetrations through fire-rated and other partitions.
   j. Equipment
   k. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
   l. Hangers and supports, including methods for duct and building attachment restraints and vibration isolation.
   m. Indicate waste and storm piping where it occurs in the area of ductwork.
   n. Locate electrical gear on plan. Ductwork is not to run above panels.
   o. Ductwork is to be shown double line with indicated width and height.
   p. Allowance to be made for lining and/or insulation.
   q. Duct sizes shown on contract drawings may be flattened to a 4 to 1 ratio when necessary to establish clearance. Such transitions are to be included in the contract price.
   r. Ductwork fabrication shall not proceed until shop drawings are submitted for review.
   s. All dampers, grilles, registers, diffusers, access panels, louvers, coils, filters, and other components of the system are to be indicated.
   t. Provide detail of fire damper assembly.
   u. Provide drawing sections when requested by the engineer.
   v. Coordinate sheet metal drawings with light fixture layout and sprinkler system piping and heads and shown on the drawing.

D. Delegated-Design Submittal:
   1. Sheet metal thicknesses.
   2. Joint and seam construction and sealing.
   3. Reinforcement details and spacing.
   4. Materials, fabrication, assembly, and spacing of hangers and supports.
   5. Design Calculations: Calculations including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports.

1.04 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
   2. Suspended ceiling components.
   3. Structural members to which duct will be attached.
   4. Size and location of initial access modules for acoustical tile.

5. Penetrations of smoke barriers and fire-rated construction.
6. Items penetrating finished ceiling including the following:
   a. Luminaires.
   b. Air outlets and inlets.
   c. Speakers.
   d. Sprinklers.
   e. Access panels.
   f. Perimeter moldings.

B. Welding certificates.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
   3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."

C. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.01 RECTANGULAR DUCTS AND FITTINGS – SMACNA STANDARDS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 FABRICATED DUCT REQUIREMENTS - DUCTMATE

A. All interior rectangular ducts shall be constructed with G-60 or better galvanized steel (ASTM A-653-94) LFQ, chem treat. Exterior ductwork shall be G-90 or better galvanized steel LFQ, chem treat. Kitchen, shower, or dishwasher exhaust shall be aluminum with aluminum joints.

B. Materials: Support, access doors not part of ducts, bar or angle reinforcing damper rods and items

made of uncoated mild steel shall be painted with two coats of primer or provide galvanized equivalent.

C. Longitudinal Seams. Pittsburgh lock shall be used on all longitudinal seams. All longitudinal seams will be sealed with mastic sealant. Snaplock is not acceptable.

D. Flanged interior Gasket. Ductmate 440 or a Butyl Rubber Gasket which meets Mil-C 18969B, Type II Class B, TT-C-1796 A, Type II Class B, and TTS-S-001657 must also pass UL-723. This material, in addition to the above, shall not contain vegetable oils, fish oils, or any other type of vehicle that will support fungal and/or bacterial growth associated with dark, damp areas of ductwork. The recommended test procedure for bacterial and fungal growth is found in 21CFR 177, 1210 closures with sealing gaskets for food containers.

E. Ductmate or W.D.C.I. proprietary duct connection systems will be accepted. Duct constructed using these systems will refer to the manufacturers guidelines for sheet gauge, intermediate reinforcement size and spacing, and joint reinforcements.

F. Formed - on flanges (T.D.C./T.D.F./T-25A/T-25B) be accepted. Formed on flanges will be constructed as SMACNA T-25 flanges, whose limits are defined on page 1.36 1995 SMACNA Manual, Second Edition. No other construction pertaining to formed - on flanges will be accepted. Formed on flanges shall be accepted for use on ductwork 42" wide or less and must include the use of corners, bolts, and cleat. (Over 42", the reinforcement/joint deflection criteria no longer conform with the UMC).

G. Rectangular ductwork above the roof or outside shall be 4" water gauge construction.

H. Pool return or exhaust ductwork above the roof shall be 4" water gauge aluminum.

I. All ductwork in moist areas (Toilet Rooms, locker rooms, kitchens, etc.) shall be aluminum construction with aluminum hangers, supports, and fasteners.

2.03 ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Ductmate Industries, Inc.
      b. Elgen Manufacturing.
      c. Linx Industries (formerly Lindab).
      d. McGill AirFlow LLC.
      e. MKT Metal Manufacturing.
      f. SEMCO LLC.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
   1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
   1. Fabricate round ducts larger Than 90 inches in diameter with butt-welded longitudinal seams.

D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical

Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Provide double wall with 1” insulation and perforated liner for all air conditioning supply ducts.

2.04 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
   1. Galvanized Coating Designation For Interior Ductwork: G60.
   2. Galvanized Coating Designation For Exterior Ductwork: G90.
   3. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

E. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
   1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

G. Fiberglass ductboard is not acceptable.

2.05 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:
   1. Application Method: Brush on.
   2. Solids Content: Minimum 65 percent.
   3. Shore A Hardness: Minimum 20.
   4. Water resistant.
   5. Mold and mildew resistant.
   6. VOC: Maximum 75 g/L (less water).
   7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
   8. Service: Indoor or outdoor.
   9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Comply with ASTM C 920.
   1. General: Single-component, acid-curing, silicone, elastomeric.
   2. Type: S.
   3. Grade: NS.
   4. Class: 25.
   5. Use: O.
   6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated

according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

E. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.06 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to

building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
   1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
   2. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
   3. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
   4. Conditioned Space, Return-Air Ducts: Seal Class C.

3.03 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Where practical, install concrete inserts before placing concrete.
   2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
   3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
   5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum interval of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.04 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.05 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.06 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
    1. Underground Ducts: Concrete-encased, PVC-coated, galvanized sheet steel with thicker coating on duct exterior.
B. Supply Ducts:
    1. All Supply Ductwork:
        a. Pressure Class: Positive 2-inch wg.
        b. Minimum SMACNA Seal Class: C for 0-2”; B for 3”; A for 4”,6”,10”.
        c. SMACNA Leakage Class for Rectangular: 16 for 0-2”; 8 for 3”; 4 for 4”,6”,10”.
        d. SMACNA Leakage Class for Round and Flat Oval: 8 for 0-2”; 4 for 3”; 2 for 4”,6”,10”.
    2. Ductwork from Unit Down Shaft to Floor:
        a. Pressure Class: Positive 3-inch wg.
        b. Minimum SMACNA Seal Class: B.
        c. SMACNA Leakage Class for Rectangular: 8.
        d. SMACNA Leakage Class for Round and Flat Oval: 4.
C. Return Ducts:
    1. All Return Ductwork:
        a. Pressure Class: Positive or negative 1-inch wg.
        b. Minimum SMACNA Seal Class: C.
        c. SMACNA Leakage Class for Rectangular: 16.
        d. SMACNA Leakage Class for Round and Flat Oval: 8.
D. Intermediate Reinforcement:
    1. Galvanized-Steel Ducts: Galvanized steel.
    2. PVC-Coated Ducts:
        a. Exposed to Airstream: Match duct material.
        b. Not Exposed to Airstream: Galvanized.
    3. Stainless-Steel Ducts:
        a. Exposed to Airstream: Match duct material.
        b. Not Exposed to Airstream: Galvanized.
    4. Aluminum Ducts: [Aluminum] [or galvanized sheet steel coated with zinc chromate].
E. Elbow Configuration:
    1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
        a. Velocity 1000 fpm or Lower:
            1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
            2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:
   1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
   2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
   3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:
   1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
   2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
   3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
   a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
   b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
   c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
   a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
      1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
      2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
      3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
      4) Radius-to Diameter Ratio: 1.5.
   b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
   c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

END OF SECTION

SECTION 23 31 21 - DUCTWORK CLEANING

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to Section 23 05 00 for requirements which are applicable to this section.
B. Refer to NFPA and International Mechanical codes.
C. Refer to ASHRAE, ASTM, OSHA and UL standards.
D. Refer to NADCA (National Air Duct Cleaners Association) standards.
E. Refer to ACR 2006 assessment, cleaning, and restoration of HVAC systems.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to inspect, clean and internally coat the existing supply air and return air duct system.

1.03 SUBMITTALS

A. Submit manufacturers' data sheets of coating.

1.04 QUALITY ASSURANCE

A. Provide adequate supervision of labor force to see that cleaning and coating operations are performed correctly.
B. Work shall be performed by certified National Air Duct Cleaners Assoc. Specialists.
C. Provide NADCA certificate at completion of work.

PART 2 - PRODUCTS

2.01 FUNGICIDAL PROTECTIVE COATING

A. Polyacrylate copolymer emulsion specifically formulated for long term fungicidal activity, with no loss of activity on aging shall contain fungicides that will effectively prevent the growth and spread of molds and bacteria on its surface and provide a tough, elastic protective finish that allows for movement without splitting to create lodging places for bacteria.
B. Properties:
   1. Color: White
   2. Application Consistency: Brush or Airless Spray
   3. Average non-volatile (ASTM C 461) - 58% by volume.
   4. Coverage Range (FSTM 71) - Wet coverages shown are for smooth non-porous surfaces. Porous or rough surfaces may require higher gallonage to obtain required dry thickness. 1.25 gal. /100 square feet 2 (0.51 1/m 2); .020 in. Wet thickness (.51 mm); .011 in. Dry

thickness (.27 mm).

5. Drying Time (ASTM D 1640) - Set to touch: 4 hours; dry through: 16 hours.
6. Water Vapor Permeance (ASTM F 1249) - Tested at 90% R. H. differential and 100 deg. F (38 deg. C) 6.0. Perms at .011 in. (4.0 metric perms at .26 mm).
7. Service Temperature Limits (FSTM 70) (Temperature at coated surface) - Minus 20 deg. F to 200 deg. F (-29 deg. C to 93 deg. C).
8. Safety - Wet flammability (ASTM D 3278). No flash to boiling 210 deg. F (99 deg. C).
9. Surface Burning Characteristics (ASTM E 84) - Flame Spread: 15 - Smoke Developed: 5. Tested at coverage rate of 80 square feet per gallon. Applied to inorganic reinforced cement board. The flame spread may vary at different product thicknesses and/or when applied over other surfaces.

C. Manufacturer: Foster 40-20.

PART 3 - EXECUTION

3.01 DUCT CLEANING

A. Preparing and protecting work areas with 4ml. Poly, as necessary.
B. Performing the work in compliance with the Occupational Safety and Health Administration (OSHA) Standards requiring compliance by all private employers on an ongoing basis under the General Industry (29CFR 1910) and Construction Industry (29CFR 1926). Regulations, which include but is not limited to:
   1. Record keeping OSHA 1910.20.
   2. Confined Space Entry Requirements OSHA 1910.146
   3. Respiratory Protection OSHA 1910.134
   4. Hazardous Communications OSHA 1910.1200
   5. Lock-Out/Tag-Out Protection OSHA 1910.147
C. Marking the position of all balancing dampers prior to cleaning process.
D. Removing and cleaning supply registers and exhaust air grills and louvers. (If removable)
E. Providing access ports in accordance with SMACNA standards where necessary to thoroughly clean the entire system. Provide pre-manufactured latchable access panels.
F. Removing, inspecting and installing upon completion all filtration devices. Install new filters matching existing filters.
G. Removing of all visible debris and contaminants from the outside air duct system and other associated components. This is to be performed in accordance with NADC Standards 1992-01.
H. Leaving all work areas in a neat and orderly fashion, and removing all accumulated debris from work site.
I. All registers, grilles louvers to be securely reinstalled and mechanical dampers restored to their original positions.
J. Checking total system upon completion to ensure functional operation in similar manner in which system was operating prior to cleaning process.
K. Any deficiencies reported to project engineer.

3.02 INTERNAL DUCT CLEANING AND COATING

A. After cleaning and vacuuming inspect internal duct for damage and/or deterioration. Upon

completion of the inspection, repair ductwork is required.

B. After installation of the required access doors in the duct work and the removal of all loosened contaminants is completed, resurfacing, shall be accomplished as follows:

1. Using a spraying system with approved resurfacing agent, Foster 40-20, apply a one (1) mil thickness wet application to the liner surfaces, or as recommended by the manufacturer's specifications. Ensure even coating with broad spray tip.
2. Odors shall be controlled through the filters in the collection devices. Collection devices shall be connected to the targeted duct section so that a minimum negative pressure is maintained. Pressure within the area being resurfaced may be adjusted based on the size of the duct to restrict over spray or removal of the resurfacing. The intent of the negative pressure is to eliminate odors and to assist in the drying process, not to draw resurfacing agent into collection systems. A minimum negative pressure of .125" wg shall be used.
3. Resurfacing agent shall be approved for use inside of air distribution systems. Additives for agents shall be approved by the Owner and shall be accompanies by a current MSDS.

3.03 FUNGICIDAL COATING

A. Material Preparation: Do not thin. Keep container closed when not in use. Do not apply outdoors in damp or rainy weather.

B. HVAC Systems: Galvanized surfaces need to be vacuumed or washed clean of all accumulated mold, dust, and loose particles. Following complete cleaning procedures, sanitize the entire air duct surfaces with an approved sanitizer following manufacturer's directions. Insure that all interior surfaces are thoroughly dry before applying 40-20. All rusted metal surfaces must be primed with Foster 40-26 before application of 40-20. Lined air ducts should be lightly vacuum cleaned to remove all mold, dust, and loose particles, being careful not to tear or loosen the liner. Following complete cleaning procedures, the entire air duct surfaces are to be sanitized as above.

C. Application: Apply Foster 40-20 to all surfaces by brush, airless spray at a rate of approximately 1.25 gal. Per 100 square feet. Always ensure adequate ventilation. Brushing will require two coats applied at 90 degrees to each other. Under normal circumstances a spray application can be completed in one coat, but for extremely porous or irregular surfaces, a second coat may be required. Insure that the finished surface is smooth and homogeneous. For airless spray application, uses an electric 30:1 unit such as a Graco EH-433 with a .021-.025 fluid tip and 800-900 psi atomizing pressure at the gun.

D. For HVAC systems interior surfaces: Always ensure negative air pressure in the HVAC system during application. After one hour has elapsed from completion of application, circulate fresh air throughout the system to dry the coating. Be sure exhausted air is odorless before ventilating into occupied room areas.

E. Clean-up - Use fresh water to clean brushes and equipment before product dries. Dry product may be removed with chlorinated solvents (non-flammable) or Xylol (flammable).

F. Hazard Statement: Harmful if swallowed or absorbed through skin. Causes moderate eye irritation. Prolonged skin contact may cause irritation. Acute overexposure to vapors may cause dizziness, headache, nausea, and unconsciousness. Since emptied containers may retain product residue, follow label warnings even after container is empty.

3.04 CERTIFICATION

A. At completion of the work submit certification of the National Air Duct Cleaners Association stating that work was performed in accordance with their standards.

END OF SECTION

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Backdraft and pressure relief dampers.
2. Manual volume dampers.
3. Control dampers.
4. Flange connectors.
5. Turning vanes.
6. Duct-mounted access doors.
7. Flexible connectors.
8. Duct accessory hardware.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.
B. Sustainable Design Submittals:
1. Product data showing compliance with ASHRAE 62.1.
2. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances, and method of field assembly into duct systems and other construction. Include the following:
a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.
e. Wiring Diagrams: For power, signal, and control wiring.

1.03 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.01 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other

imperfections.

2.02 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
   1. Galvanized Coating Designation: G60 for indoor applications and G90 for exterior applications.
   2. Exposed-Surface Finish: Mill phosphatized.
B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts.
C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Warming and Ventilating; a Mestek Architectural Group company.
   2. Greenheck Fan Corporation.
   3. Lloyd Industries, Inc.
   4. Nailor Industries Inc.
   5. NCA Manufacturing, Inc.
   6. Pottorff.
   7. Ruskin Company.
B. Description: Gravity balanced.
C. Maximum Air Velocity: 2500 fpm.
D. Maximum System Pressure: 1-inch wg 2-inch wg 3-inch wg 6-inch wg.
E. Frame: Hat-shaped, 0.063-inch-thick extruded aluminum or 0.05-inch- thick stainless steel, with welded corners or mechanically attached and mounting flange.
F. Blades: Multiple single-piece blades, center pivoted, maximum 6-inch width, 0.050-inch-thick aluminum sheet with sealed edges.
G. Blade Action: Parallel.
H. Blade Seals: Extruded vinyl, mechanically locked or Neoprene, mechanically locked.
I. Blade Axles:
   1. Material: Stainless steel.
   2. Diameter: 0.20 inch.
J. Tie Bars and Brackets: Galvanized steel.
K. Return Spring: Adjustable tension.
L. Bearings: Synthetic pivot bushings.
M. Accessories:
   1. Adjustment device to permit setting for varying differential static pressure.
   2. Counterweights and spring-assist kits for vertical airflow installations.
   3. Screen Mounting: Rear mounted.
   4. Screen Material: Aluminum.
   5. Screen Type: Bird or Insect.
   6. 90-degree stops.

N. Air Leakage: Class I – Not to exceed 8 CFM/FT2 @ 4” w.g. AMCA Certified.

2.04 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Warming and Ventilating; a Mestek Architectural Group company.
      b. Flexmaster U.S.A., Inc.
      c. McGill AirFlow LLC.
      d. Nailor Industries Inc.
      e. Pottorff.
      f. Ruskin Company.
   2. Standard leakage rating.
   3. Suitable for horizontal or vertical applications.
   4. Frames:
      a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
      b. Mitered and welded corners.
      c. Flanges for attaching to walls and flangeless frames for installing in ducts.
   5. Blades:
      a. Multiple or single blade.
      b. Parallel- or opposed-blade design.
      c. Stiffen damper blades for stability.
      d. Galvanized steel, 0.064 inch thick.
   6. Blade Axles: Galvanized steel.
   7. Bearings:
      a. Molded synthetic.
      b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
   8. Tie Bars and Brackets: Galvanized steel.

B. Standard, Aluminum, Manual Volume Dampers:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Warming and Ventilating; a Mestek Architectural Group company.
      b. McGill AirFlow LLC.
      c. Nailor Industries Inc.
      d. Pottorff.
      e. Ruskin Company.
   2. Standard leakage rating.
   3. Suitable for horizontal or vertical applications.
   4. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
   5. Blades:
      a. Multiple or single blade.
      b. Parallel or opposed-blade design.
      c. Stiffen damper blades for stability.
      d. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
      e. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
   6. Blade Axles: [Galvanized steel] [Stainless steel] [Nonferrous metal].
   7. Bearings:

a. [Oil-impregnated bronze] [Molded synthetic] [Stainless-steel sleeve].
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Aluminum.

C. Jackshaft:
1. Size: 1-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:
1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.05 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Warming and Ventilating; a Mestek Architectural Group company.
2. Arrow United Industries.
3. Greenheck Fan Corporation.
4. Lloyd Industries, Inc.
5. McGill AirFlow LLC.
6. Metal Form Manufacturing, Inc.
7. Nailor Industries Inc.
8. Pottorff.
9. Ruskin Company.
10. Tamco
11. Young Regulator Company.

B. Frames:
1. Hat, U, or Angle shaped.
2. 0.05-inch thick stainless steel.
3. Mitered and welded corners.

C. Blades:
1. Multiple blade with maximum blade width of 6 inches.
2. Opposed blade design.
3. Aluminum.
4. 0.0747-inch- thick dual skin.
5. Blade Edging: Closed-cell neoprene.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

D. Blade Axles: 1/2-inch-diameter; nonferrous metal; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
1. Operating Temperature Range: From minus 40 to plus 200 deg. F.

E. Bearings:
1. Molded synthetic.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

F. Air Leakage: Class I – Not to exceed 8 CFM/FT2 @ 4”w.g.. AMCA Certified.

2.06 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Ductmate Industries, Inc.
B. Description: Roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
C. Material: Galvanized steel.
D. Gage and Shape: Match connecting ductwork.

2.07 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Aero-Dyne Sound Control Co.
   2. Ductmate Industries, Inc.
   3. Duro Dyne Inc.
   4. Elgen Manufacturing.
   5. Hardcast, Inc.
   6. METALAIRE, Inc.
   7. SEMCO LLC.
B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
   1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."
E. Vane Construction: Double wall.

2.08 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Warming and Ventilating; a Mestek Architectural Group company.
   2. Ductmate Industries, Inc.
   3. Elgen Manufacturing.
   4. Flexmaster U.S.A., Inc.
   5. Greenheck Fan Corporation.
   6. McGill AirFlow LLC.
   7. Nailor Industries Inc.
   8. Pottorff.
B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
   1. Door:
      a. Double wall, rectangular.
      b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
      c. Vision panel.

d. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
e. Fabricate doors airtight and suitable for duct pressure class.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:
a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches with outside handles.
d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside handles.

2.09 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M.
2. Ductmate Industries, Inc.
3. Flame Gard, Inc.
B. Labeled according to UL 1978 by an NRTL.
C. Panel and Frame: Minimum thickness 0.0428-inch stainless steel.
D. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.
E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg. F.
F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
2. Elgen Manufacturing.
3. Hardcast, Inc.
B. Materials: Flame-retardant or noncombustible fabrics.
C. Coatings and Adhesives: Comply with UL 181, Class 1.
D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5 ¾ inches wide attached to two strips of 2 ¾ -inch-wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.
E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg. F.
F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd.
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg. F.

2.11 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
C. Install backdraft or control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
    1. Install steel volume dampers in steel ducts.
    2. Install aluminum volume dampers in aluminum ducts.
E. Set dampers to fully open position before testing, adjusting, and balancing.
F. Install test holes at fan inlets and outlets and elsewhere as indicated.
G. Install fire and smoke dampers according to UL listing.
H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
    1. On both sides of duct coils.
    2. Upstream from duct filters.
    3. At outdoor-air intakes and mixed-air plenums.
    4. At drain pans and seals.
    5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
    6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
    7. At each change in direction and at maximum 50-foot spacing.
    8. Upstream from turning vanes.
    9. Upstream or downstream from duct silencers.
    10. Control devices requiring inspection.
    11. Elsewhere as indicated.
I. Install access doors with swing against duct static pressure.
J. Access Door Sizes:
    1. One-Hand or Inspection Access: 8 by 5 inches.
    2. Two-Hand Access: 12 by 6 inches.
    3. Head and Hand Access: 18 by 10 inches.
    4. Head and Shoulders Access: 21 by 14 inches.
    5. Body Access: 25 by 14 inches.
    6. Body plus Ladder Access: 25 by 17 inches.
K. Install flexible connectors to connect ducts to equipment.
L. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use

flexible ducts to change directions.

M. Connect diffusers or light troffer boots to ducts with maximum 10 feet lengths of flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with draw bands.

O. Install duct test holes where required for testing and balancing purposes.

P. Install volume damper control – remote external control when balancing dampers are located above in accessible ceilings similar to gypsum board.

3.02 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.

END OF SECTION

SECTION 23 81 26 - SPLIT-SYSTEM AIR-CONDITIONERS (6-25 Tons)

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1.03 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. ASHRAE Compliance:
   1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
   2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."
C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
   1. Warranty Period:
      a. For Compressor: Five years from date of Substantial Completion.
      b. For Parts: One year from date of Substantial Completion.
      c. For Labor: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Carrier Corporation; a unit of United Technologies Corp.
   2. Trane.
   3. YORK; a Johnson Controls company.

2.02 INDOOR UNITS (6 – 25 TONS)

A. Vertical or Horizontal Evaporator-Fan Components:
   1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
   2. Insulation: Faced, glass-fiber duct liner.
   3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
   4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
   5. Single refrigeration circuit through 7 ½ ton, dual refrigeration circuit over 7 ½ ton, copper tube aluminum fin coil, factory pressure tested.
   6. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
   7. Fan Motors:
      a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
      b. Belt Driven Fan Motor. Provide dual fans on 12.5-25 ton air handlers.
      c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
   8. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
   9. Condensate Drain Pans:
      a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
         1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
         2) Depth: A minimum of 2 inches deep.
      b. Single-wall, galvanized steel sheet.
      c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on [one end] [both ends] of pan.
         1) Minimum Connection Size: NPS 2-inch.
      d. Pan-Top Surface Coating: Asphaltic waterproofing compound.
      e. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
   10. Air Filtration Section:
      a. General Requirements for Air Filtration Section:

1) Comply with NFPA 90A.
2) Minimum Arrestance: According to ASHRAE 52.1 and MERV according to ASHRAE 52.2.
3) Filter-Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

b. Disposable Panel Filters:
1) Factory fabricated, viscous-coated, flat-panel type.
2) Thickness: 2 inches.
3) Merv according to ASHRAE 52.2: 8,13.
4) Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent.
5) Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, and hinged; with pull and retaining handles.
6) Filter Frame shall be fully gasketed.

2.03 ACCESSORIES

A. Control equipment and sequence of operation are specified in Section 230933 "Automatic Temperature Control."
B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
C. Automatic-reset timer to prevent rapid cycling of compressor.
D. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
E. Vibration isolation.
F. Variable Frequency Drive and rated motor.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units' level and plumb.
B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
C. Install roof-mounted, compressor-condenser components on equipment base –minimum 4 inch thick pad set on 6 inches of crushed stone.
D. Equipment Mounting:
1. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."
E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
F. Coordinate the electrical requirements of the unit with the electrical contractor prior to ordering or installing the equipment.
G. Furnish and install all controls and control wiring. Wiring shall be in accordance with the NEC. Control wiring above the roof shall be in galvanized steel conduit with watertight fittings.
H. Installations shall be in accordance with the instructions of the manufacturer and meet all requirements.

I. Protect and be responsible for equipment until accepted in place by the owner.
J. Provide condensate drain and discharge to a suitable discharge point which shall be acceptable to the owner and A/E.
K. Contractor shall interlock the air handling unit controls with the remote condensing unit. Contractor is to furnish and install an air proving switch or current sensor at the air handler's blower and be interlocked with the associated condensing unit controls to shut down if power to the blower is disconnected.
L. All filters shall be new at time of acceptance by the owner.

3.02 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.
C. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 233300 "Air Duct Accessories."

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
B. Tests and Inspections:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
C. Remove and replace malfunctioning units and retest as specified above.
D. Prepare test and inspection reports.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION

CONTENTS

DIVISION 26 - ELECTRICAL

DIVISION 26 - ELECTRICAL

SECTION 26 00 00 - STANDARD CONDITIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.01 REGULATIONS, CODES, STANDARDS

A. Reference Codes, applicable sections of the following codes and standards shall be considered as binding to the work of this project:

NEMA	National Electrical Manufacturers' Association
NEC	National Electrical Code (NFPA 70) - 2014 Edition
NECA	National Electrical Contractors' Association
NEIS	National Electrical Installation Standards
EGSA	Electrical Generating Systems Association
IBC	International Building Code
NFPA	National Fire Protection Association
IEEE	Institute of Electrical and Electronics Engineers
UL	Underwriter's Laboratories, Inc.
IES	Illuminating Engineering Society
OSHA	Occupational Safety and Health Administration
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
FM	Factory Mutual
IRI	Industrial Risk Insurers
ISO	Insuring Services Office
IPCEA	Insulated Power Cable Engineers Assoc.
ADA	Americans with Disability Act
NETA	International Electrical Testing Association

B. All local codes are to be incorporated.
C. The latest adopted codes and latest editions of standards shall be the basis of conformance.
D. Obtain and pay for all permits and inspections, and any associated charges.
E. Inspection Agency Certificate of Inspection to be provided at completion of the work. Inspection by Middle Department Inspection Agency, Inc., or other local inspection agency.
F. Drawings, Contract, General Conditions and Supplementary Conditions form a part of this section, by reference thereto and shall have the same force and effect as if printed herewith in full. Failure to review these sections shall not relieve the Contractor of his responsibility to fully comply with the terms therein.
G. Where the contract documents are more stringent but not in conflict with the applicable codes, the more stringent requirements shall be followed.

1.02 SUBMITTALS

A. The procedure for submissions of shop drawings shall be as specified in Division 1, or as a minimum, as indicated below.
B. Furnish submissions of shop drawings and samples of materials and equipment as indicated in these sections, on the drawings, or as directed by the architect/ engineer. Submissions will be made in a timely fashion such that adequate time exists to review the drawings, or material, and arrive at

the site in accordance with the project schedule.

C. Submissions will not be accepted with work defined as "By Others". Identify contractor by name and with his approval so indicated. Submissions are required prior to purchasing, fabrication, or installation of any material or equipment. Submissions shall be reviewed and certified by the submitting contractor that they are in accordance with the project documents.

D. When requested by the engineer, shop drawings shall be required to be submitted to designated agencies for review and approval prior to submission to the engineer.

E. Contractor shall arrange and pay for all tests and inspections specified herein or required by above agencies and furnish required certificate of inspection to owner.

F. Contractor shall provide performance test data and wiring diagrams of all electrical equipment.

G. Submissions shall include warrantees by the manufacturer for equipment being provided. Submissions for commonly related items such as fixtures, trim, carriers, shall be combined in a single brochure clearly identifying all items being furnished.

H. Shop drawings and submittals shall be checked and stamped by the contractor before submitting. They shall conform to measurements made at the site, the contract requirements, and shall be coordinated with all other trades.

I. Specific models in catalog sheets must be identified as well as all options, voltages, phases, etc. identified to be clear as to what is being provided.

J. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/ travel/ access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

K. To aid in the preparation of submittals or shop drawings, the engineer can provide the electronic files for use by the contractor. The electronic files will be provided upon execution of the engineer’s electronic file release contract prepared specifically for this project. The electronic files will be released in the format used by the architect and engineer to design the project. If this file format is not compatible with the contractor’s needs, additional charges for providing the changes to the requested file format may be necessary at $150.00 per hour billable to the contractor.

1.03 SUBSTITUTIONS

A. Substitution of other than specified manufacturers shall not be allowed after bid date.

B. Prior approval is required for other manufacturers. If the contractor wishes for alternate materials or equipment to be considered, he must submit information at least ten days prior to the bid date. If acceptable, an addendum will be issued allowing the contractor to utilize the approved alternate.

C. Samples shall be provided when directed by the architect or engineer.

D. If the contractor submits alternate equipment, manufacturers, systems, methods, or materials not specifically identified in the specifications, additional review and investigation time may be required by the engineer. If the engineer determines additional review time is required because of the substitution, then this will be a billable service provided by the engineer at the rate of $150.00 per hour. Also billable will be any redesign time and revisions to drawings should they be necessary for incorporation into the work. Services will be billable to the contractor making such substitutions and will be payable prior to approval, or rejection.

E. If the contractor elects to submit alternate equipment, manufacturers, systems, methods, or materials, not specifically identified in the drawings and specifications, it is the contractor’s responsibility to coordinate the work with other trades and pay for any associated costs with the substitution or change.

F. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/travel/access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials and equipment in manufacturer's original cartons or on skids.
B. Store materials in dry enclosure out of way of work progress.
C. Protect equipment, fixtures, and lenses after placement.

1.05 REFERENCE

A. Requirements established within the portions of this Project Manual titled Division 1, General Requirements are collectively applicable to the work of this section.
B. Instructions to Bidders, Special Conditions and Addenda as issued are part of this specification.
C. Electrical drawings along with all other project drawings represent the work of this Division.
D. Drawings, Contract, General Conditions and Supplementary Conditions form a part of this section, by reference thereto and shall have the same force and effect as if printed herewith in full. Failure to review these sections shall not relieve the Contractor of his responsibility to fully comply with the terms therein.

1.06 WORK SUMMARY

A. Provide labor, materials, equipment, and supervision necessary to install complete, operating electrical systems as indicated on the drawings and specified herein, including all work at the site and within the proposed construction areas to accomplish the require work.
B. Contractor shall provide all demolition necessary to remove, replace, repair, install new or modify existing work whether it be walls, floors, ceilings, structure, mechanical or electrical required to install his work. Contractor shall replace all work to leave in a finished condition. Pipe, conduit, ductwork, and wiring shall be cut back behind wall surfaces above ceilings and below floor levels so that a patch can be placed over the opening.
C. Demolition:
    1. Contractor shall disconnect and remove the entire existing electrical system including select panels, luminaires, conduit, wiring, supports, fasteners, starters, fire alarm devices and wiring, telephone equipment and wiring, battery packs, controls, outlets, and devices within the renovation area.
    2. Electrical contractor shall verify all existing conditions prior to commencing work.
    3. Remove branch circuits back to the power source or the nearest device to remain active. Restore all circuits interrupted by the demolition work to maintain circuit continuity.
    4. Label all overcurrent protection devices made "spare" due to demolition. Update all panelboard directories impacted by the demolition.
    5. Relocate existing branch circuits which interfere with new construction whether specifically identified or not. Refer to architectural drawings for new walls, structure, millwork, etc. which may require existing conduit, wire, etc. to be relocated.
    6. It is the intent that power remain active in adjacent areas during the construction. Contractor is to modify existing wiring arrangement to comply.

7. All equipment and appurtenances removal are to be disposed of properly. Refer to local, state, and federal requirements.

D. All work shown on the drawings and not expressly mentioned in the specifications and all work specified but not shown on the drawings, but necessary for the proper execution of same shall be performed by the contractor. It is not the intent of the drawings and specifications to describe every feature and detail of the work.

E. No additions to the contract amount will be approved for any materials, equipment, or labor to perform additional work unless it can be clearly shown to be beyond the scope and intent of the drawings and specifications.

F. Provide roof penetrations for electrical work and all associated roof work.

G. Provide a power system study. The study is to include short-circuit, protective device evaluation, protective coordination study and arc fault evaluation studies.

H. Provide connections to existing/relocated emergency generator set, diesel powered, automatic transfer switch and all associated controls and appurtenances.

I. Provide addressable fire alarm system with battery back-up, (horn/ strobes) (speaker/ strobes), pull stations, detectors, strobes, duct detectors, remote annunciator, elevator controls for recall and shutdown of power, telephone auto dialer, and all associated controls and appurtenances.

J. Provide exit and emergency luminaires throughout with emergency power supply in addition to normal power.

K. Provide power to HVAC and plumbing equipment as necessary to have complete, operating systems.

L. Provide luminaires throughout.

M. Provide telephone conduit system. Provide (2) CAT 3 plenum rated telephone cables from the telephone demarcation point to the fire alarm control panel for the auto dialer.

N. Provide connections to Uninterruptible Power Supply System by others (UPS) with input filter, transformer, battery, and all associated controls and appurtenances.

O. Provide grounding system for facility in accordance with the NEC.

P. Provide connection for tenant signage. Coordinate all requirements with the architect and owner.

Q. Base bid is to provide all panelboards, and all feeders as copper conductors. Alternate bid is to provide all as aluminum conductors of equivalent current carrying capacity.

R. Provide code required signage (i.e., NEC 110.34, NEC 700.8, and 695.4 B3).

S. Provide third-party certification of all packaged systems by a Nationally Recognized Testing Laboratory (NRTL) in accordance with OSHA Federal Regulations 29CFR1910.303 and .399 as well as Pamphlet #70 and NEC Article 90.7.

T. Refer to Commissioning of Systems Specification for additional scope of work.

1.07 SITE INSPECTION

A. Visit site, inspect, and become aware of all conditions which may affect the work. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.

B. Submission of a bid will be deemed evidence of being in compliance with this requirement. Contractor may not request additional costs for existing conditions which were evident from inspection of the site.

C. Before ordering materials or commencing with any work, the contractor shall verify all measurements at the building. Coordination of equipment, materials, spaces, and dimensions are the responsibility of the contractor.

1.08 DRAWINGS AND SPECIFICATIONS

A. Drawings and specifications are intended to be taken as a whole and each is to supplement the other. It is not intended that all work must be both shown on drawings and specified in the specifications.
B. An item shown on the drawings and not indicated in the specifications is to be understood to be required for the project. An item specified and not shown on the drawings is to be understood to be required for the project.
C. If there is a conflict between the drawings and specifications it is to be understood that the more strict or more expensive interpretation shall govern. Also, if a conflict exists between specification sections or between drawing plans and details, it is to be understood that the more strict or more expensive interpretation shall govern.
D. The architect's or engineer's interpretation of the documents shall be binding upon the contractor. If a question arises, the contractor shall ask for an interpretation prior to bidding and an answer shall be issued as an addendum to all bidders.
E. If a question arises after bidding the architect's and/ or engineer's interpretation shall govern.
F. The drawings are generally diagrammatic and necessary field coordination and adjustment must be provided by the contractor prior to installation. Such deviations to the work to allow for coordination shall be kept to a minimum and any such deviations shall be at no extra cost.

1.09 MINIMUM INTEGRATED EQUIPMENT SHORT CIRCUIT RATING:

A. Where the contract documents indicate secondary service from the utility Company (208/120V, 3 phase, or 480/277V, 3 phase) available short circuit currents including system motor contribution (amperes RMS symmetrical) at the line terminals of the UL service entrance labeled main distribution panelboard or switchboard, shall be in accordance with the following tabulation:

Service Minimum	**Service Entrance**	**Panelboard Rating**	**Transformer Rating**
kVA	%Z	208/ 120V	480/ 277V
75	1.5	14,500	10,000
112.5	1.5	22,000	10,000
125	1.5	29,000	13,000
225	1.5	43,000	19,000
300	1.5	58,000	25,000
500	1.5	96,000	42,000
750	5.5	42,200	18,000
1000	5.5	56,100	24,500
1500	5.5	85,000	37,000
2000	5.5		49,000
2500	5.5		51,000
3000	5.5		73,500

B. The Integrated Equipment short circuit rating of the main distribution panel, or switchboard shall meet or exceed the tabulated minimum values. This shall be construed to mean that the equipment withstands capability (bus-bracing), and interrupting capacities of main and feeder devices, shall each meet or exceed the tabulated minimum values.
C. Service transformer ratings shall be as indicated on the drawings. If said ratings are not indicated, the contractor shall contact the engineer and/ or utility company for clarification.
D. The only deviations from this tabulation that are permissible shall be the results of a short circuit study (if and as specified in Section 26 05 73 Power System Studies), or documented data from the utility company.

1.10 PROGRESS SCHEDULE

A. Provide a project schedule which shall show start, sequence of each type of work, milestone schedule, and completion of each type of work, with overall completion date.

1.11 COST SCHEDULE

A. Provide a detailed cost breakdown indicating labor and material amounts for various types of work.
B. AIA forms are required for this submission.

1.12 OFFICE

A. The contractor shall set up his job office (desk) where directed by the owner.

1.13 STORAGE

A. Material shall be stored only where directed by the owner.

1.14 SANITARY

A. The contractor will at his own expense, provide and maintain in a sanitary condition, a portable chemical toilet.
B. Toilet will be located where directed by the owner.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials and equipment shall be new and in present production of major manufacturers.
B. All materials and equipment shall be in conformance with accepted trade standards as a minimum. Where specifications exceed any minimum standard, the specifications shall govern.
C. Reference of equipment in the singular shall be deemed to apply to as many such items as may be required to complete the work.
D. The word “provide” means “furnish and install complete, tested, and adjusted as necessary with all accessories, wiring methods, switching, lenses, mounting hardware, cover plates, hangers and supports”.

2.02 FASTENERS AND SUPPORTS

A. All work shall be securely fastened to building construction.
B. Utilize toggle or machine bolts in hollow construction.
C. Utilize machine screws for steel construction.
D. Utilize expansion shields for masonry construction.
E. Utilize lag bolts for wood construction.
F. All fasteners shall be galvanized or plated with rustproof finish.
G. Maximum load on fasteners shall be at a safety factor of 4:1 for a tested sample.

2.03 MOTOR STARTERS AND CONTACTORS

A. Single-phase manual motor starters with overloads shall be provided under the electrical portion of the work for fractional horsepower motors up to ½ HP.
B. Polyphase motor starters and motor starters above ½ HP shall be furnished under other portions of the work.
C. The starters in A, or B above shall be installed under the electrical portion of the work.
D. Polyphase starters shall be magnetic combination type, across-the-line, electrically operated, electrically held, three-pole assemblies, with arc-extinguishing characteristics, silver-to-silver renewable contacts, three-pole thermal bi-metallic, red “run” pilot light, individual phase protection, with overload heaters matched to motors installed and with four auxiliary contacts, Hand-Off-Auto switch, and control transformer.
E. For single-phase motors above ½ HP provide magnetic combination, single-phase motor starters with overloads, non-fusible disconnect switch, red run pilot light, integral 120 volt control transformer with dual primary fusing, auxiliary contacts.
F. Starters shall be as manufactured by G.E., Cutler Hammer, Siemens, Square D or Allen Bradley.
G. Contactors shall be across-the-line, electrically operated, mechanically held three-pole assemblies for tungsten and ballast luminaire loads. Acceptable manufacturers: GE, Cutler Hammer, Siemens, Square D or Allen-Bradley.
H. Manual motor starters without overloads in NEMA 1 enclosure equal to G. E. Type TC shall be used for the following load:
    1. 30 amperes or less, continuous.
    2. 1 HP or less at 120 volts
    3. 2 HP or less at 240 volts

2.04 MANUFACTURERS’ NAMES

A. Manufacturers’ names are included herein to establish those suppliers who may provide products for this project subject to the requirements of the specifications. Although a manufacturer’s name may appear as an acceptable supplier it is not understood that a standard product is acceptable. Products must also meet the technical, performance, and physical requirements of the project as well as being named in the specification. Any deviations from this must be acknowledged during the bid phase by the supplier, who shall be solely responsible for any and all costs associated with the application of their product(s) in the project.
B. A design cannot be prepared which accommodates the installation of all suppliers and is not intended to do so. If certain modifications must be made to accommodate one particular supplier’s equipment it shall be considered the contractor’s responsibility to arrange for such accommodations and be financially responsible for same.

PART 3 - EXECUTION

3.01 WELDING

A. All electric power for arc welding shall be supplied by the contractor performing the work.

3.02 VEHICLES

A. Vehicle access to the site will be as directed by the owner.

3.03 RUBBISH DISPOSAL

A. Except for items or materials identified to be reused, salvaged, reinstalled, or otherwise indicated to remain property of the owner or tenant, demolished materials shall become the contractor's property and shall be removed, recycled, or disposed from the project site in an appropriate and legal manner.
B. Burning of debris on the site shall not be permitted. All debris, refuse, and waste shall be removed from the premises at regular intervals. No accumulation shall be permitted.

3.04 WORKMANSHIP

A. Maintain all public walks and access ways.
B. Erect and maintain barricades, warning signs, and other protective means as may be directed by the owner for protection of all persons and property from injury or damage.
C. Plug or cap open ends of piping systems and conduit.
D. Stored materials shall be covered to prevent damage by inclement weather, sun, dust, or moisture.
E. Protect all installed work until accepted in place by the owner. Protect luminaires.
F. Do not install plates, covers, and other finished devices until masonry, title, and painting operations are complete, or protect otherwise.
G. Protect all existing or new work from operations which may cause damage such as hauling, welding,
H. soldering, painting, insulation and covering.
I. All devices and exposed raceways are to be plumb and true. All exposed raceways in finished areas are to be coordinated with the architect/engineer prior to installation.

3.05 SCAFFOLDING

A. The contractor shall at his own expense, install, operate, protect, and maintain temporary services such as scaffolding, material hoists, access walks, etc., as may be required.

3.06 SITE UTILITIES

A. The contractor may use the existing water and electric power for temporary construction needs.
B. The owner will direct where these services may be tapped.
C. Those services that are used during construction, but are to remain, shall be refurbished to a new condition before turning back over to the owner.

3.07 CLEAN-UP

A. Remove all visible temporary tags or labels as well as any protective coverings and wrappings from fixtures and equipment.
B. Remove all spots, stains, soil, paint, spackle, and other foreign matter from all finished work.
C. Remove all trash and debris from the premises.

3.08 LUBRICATION

A. Furnish and install and maintain all required lubrication of any equipment operated prior to acceptance by the owner. Lubrication shall be as recommended by the equipment manufacturer.
B. Provide one year's supply of lubricants to owner at date of acceptance.

C. Verify that required lubrication has taken place prior to any equipment start-up.

3.09 EQUIPMENT START UP

A. Verify proper installation by manufacturer or his representative.
B. Advise the architect and engineer two days prior to actual start up.
C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to the architect and engineer.

3.10 OPERATING INSTRUCTIONS AND MANUALS

A. Properly and fully instruct owner’s personnel in the operation and maintenance of all systems and equipment.
B. Ensure that the owner's personnel are familiar with all operations to carry on required activities.
C. Such installation shall be for each item of equipment and each system as a whole.
D. Provide report that instruction has taken place. Include in the report the equipment and/ or systems instructed, date, contractor, owners’ personnel, vendor, and that a full operating and maintenance manual has been reviewed.
E. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalog cuts, wiring diagrams, piping diagrams, control sequences, service requirements, names and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided to owner.
F. Submit manuals for review prior to operating instruction period. Manuals shall be 8 1/2" x 11" with hard cover, suitably bound.
G. Provide to the owner any special tools necessary to operate any of the equipment.

3.11 PENETRATION SEALING

A. All penetrations of Natatorium walls, fire walls, smoke walls, and floors shall be sealed around conduits and wiring to prevent the flow of gases or smoke.
B. The sealant shall be foamed in place between the conduit or wiring and the adjacent walls and floors with Dow/ Corning RTV foam or Fire Stop Caulk.
C. All penetrations through roof structure shall be coordinated with other trades to minimize the potential for water seepage and leakage through such penetrations.
D. When electrical boxes are located on opposite side of a fire resistance rated wall assembly are within 2’-0” horizontally of each other, both devices are to be wrapped with Spec Seal Putty Pads as manufactured by Specified Technologies, Inc. or approved equivalent.

3.12 EQUIPMENT SETTING

A. Furnish and install as a minimum, a 0’-4" high concrete pad beneath all floor-mounted equipment.
B. Furnish and install as a minimum, spring vibration isolators under any equipment 10 HP and over and rubber-in-shear vibration isolation under all equipment less than 10 HP.
C. Reinforce concrete with No. 4 rods 12'-0” on center, both ways.
D. Pad to have 3/4" dowels into concrete at one per four square feet.

3.13 INSTALLATION MOUNTING HEIGHTS

A. To be verified by Architect, but in general shall be as follows (top of device elevation above finished

floor):

Lighting switches, controls:	3’-10”
Duplex receptacles:	1’-8”
Duplex receptacles over counters:	0’-8" above countertop
Telephone data wall plate and modular jack, desk phone:	1’-8”
Telephone, data wall plate and modular jack, wall phone:	3’-10”
Special outlets:	As required for equipment
Fire alarm annunciating devices:	85"
Fire alarm manual pull stations:	3’-10”
Clock receptacles:	As indicated on drawings.
CATV wall plates and modular jacks:	1’-8”
CATV wall plates and modular jacks mounted near ceiling:	Coordinate mounting height with Architect.
Thermostats (forward reach):	3’-10”
Thermostats (side reach):	3’-10”
Thermostats with lockable cover:	4’-6”

Requirements of the Americans with Disability Act and/or ANSI A117.1 shall be met.

B. Structural and mechanical details shall be coordinated before roughing in.

3.14 COORDINATION

A. Coordinate with work of other trades prior to installation.
B. Arrange for minor variations for complete coordinated installation. Provide all necessary offsets to install the work and to provide clearances for other trades.

3.15 CUTTING AND PATCHING

A. Provide for cutting and patching for all electrical work.
B. Patching to be performed by tradesmen skilled in that particular trade.
C. Contractor shall patch and repair any existing openings created by the demolition work in floors, walls, partitions, and ceilings not being reused for the new construction.

3.16 BALANCING AND TESTING

A. Electrically balance connected loads in panels.
B. The entire wiring system shall be tested to be free from grounds and faults.
C. Identify all circuits and all phase wiring at terminations.

3.17 EQUIPMENT FURNISHED BY OTHERS

A. This contractor shall make final electrical connections to equipment furnished by other contractors or the owner.
B. Provide electrical service, and disconnect equipment as required by code to supply such equipment.

3.18 RECESSES

A. Furnish information to the General Contractor as to sizes and locations of recesses required to install panels, boxes, grilles, and other equipment, and/ or devices which are to be recessed in walls.
B. Make offsets or modifications as required to suite final locations.

3.19 LABELING

A. All equipment panels, controls, safety switches, and devices shall be provided with permanent black laminated micarta white core labels with 3/8” high letters.
B. This shall also apply to all controllers, remote start/ stop pushbuttons, equipment cabinets, and wherever directed by the architect and engineer.
C. This shall not apply to individual room thermostats, and local light switches.

3.20 GUARANTEE

A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the owner unless otherwise specified.
B. Guarantee shall be extended for all non-operational periods due to failure within the guarantee period.

3.21 AS BUILT DRAWINGS

A. At the completion of the work and prior to final payment, the contractor shall furnish a reproducible as-built drawing to the architect and engineer for approval. The drawings shall indicate all work installed and its actual size, and location and identify all systems installed with locations of concealed devices, conduit, piping and other equipment and complete wiring diagrams of all systems. If acceptable, the architect and engineer will submit the as-built drawings to the owner as record drawings. If not acceptable, the architect and engineer return the drawing to the contractor to make corrections as required. The contractor will resubmit for approval.
B. The as-built drawings shall indicate measured dimensions of underground lines and other concealed work.
C. To aid in the preparation of as-built drawings, the engineer can provide the electronic files for use by the contractor. The electronic files will be provided upon execution of the engineer’s electronic file release contract prepared specifically for this project. The electronic files will be released in the format used by the architect and engineer to design the project. If this file format is not compatible with the contractor’s needs, additional charges for providing the changes to the requested file format may be necessary at $150.00 per hour billable to the contractor.

3.22 MAIN ELECTRICAL ROOM DRAWING

A. Provide 3/8" = 1'-0" scale drawings of the Main Electrical Room indicating all electrical, mechanical, plumbing, telephone, security, fire alarm and life safety equipment to be installed within this room. Exact dimensions of equipment, pads, etc., are to be indicated. Show two cross sections at important points.
B. Obtain information from other subs as appropriate.
C. Submit for review and approval along with electrical equipment submittals. Equipment will not be approved prior to review of this drawing.

3.23 WORK COMPLETION

A. The contractor shall promptly correct work rejected by the engineer or failing to conform to the requirements of the contract documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed, or completed. Costs of correcting such rejected work, including additional testing and inspections and compensation for the engineer's services and expenses made necessary thereby, shall be at the contractor's expense.

3.24 REQUEST FOR INFORMATION (RFI) REQUIREMENTS

A. All RFI's shall include the following information based on AIA Document G716:
   1. To, From, Project Name, Issue Date, RFI number in sequential order with all other trades, Requested Reply Date.
   2. Provide a description with specification and/or drawing references.
   3. Provide the senders recommendation including cost and/or schedule considerations.
   4. Provide receiver's reply space.
   5. Note an RFI reply is not an authorization to proceed with the work involving additional cost/time.

3.25 SHOP DRAWING REQUIREMENTS

A. The following is a list of required shop drawings for this project.

ELECTRICAL	**DATE REC'D**	**ACTION**	**DATE REC'D**	**ACTION**
Basic Materials and Equipment (Section 26 05 00 and 26 27 00)				
High Voltage Cable and Equipment				
Fusible Switchboard (Section 26 24 13)				
Panelboards (Section 26 24 16)				
Bus Duct (Section 26 25 00)				
Safety Switches - (Section 26 28 16)				
Automatic Transfer Switch (Section 26 36 23)				
Secondary Unit Substation (Section 26 11 16)				
Packaged Meter Centers (Section 26 27 13)				
Transformers (Section 26 22 00)				
Surge Suppression (Section 26 43 13)				
Lighting (Section 26 50 00 and 26 09 00)				
Lightning Protection (Section 26 41 13)				
Emergency Power System (Section 26 30 00)				

ELECTRICAL	**DATE REC'D**	**ACTION**	**DATE REC'D**	**ACTION**
Static Uninterruptible Power Supply (Section 26 33 53)				
Fire Alarm and Detection Systems (Section 28 30 00)				
Low Voltage Systems (CCTV, Security, DATA, Phone Entry, etc.)				
As-Builts				
Warranties				
Maintenance Manuals				
Instructions				
Ground Test				

END OF SECTION

SECTION 26 01 26 - EXISTING EQUIPMENT TO BE REUSED

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to section 26 00 00 for requirements which are applicable to this section.
B. Refer to National Electrical Testing Association Standards, particularly NETA MTS-1997 and NETA ATS-1999.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to refurbish existing equipment as specified herein and place into operation.
B. All work and accessories required to perform the intended work is to be included in the scope of work.

1.03 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's recommendations.
B. Install systems and equipment in accordance with current applicable codes.
C. Provide adequate supervision of labor force to see that installations are complete and correct.
D. Testing Agency’s Field Supervisor and/ or Technicians are to be certified according to NETA ETT-2000.

1.04 SCOPE

A. It is the intent to totally refurbish existing equipment to as-new operating condition and efficiency. All parts to be made operable, corrosion removed, repainted, adjusted, cleaned, lubricated, and repaired as necessary.
B. Schedule outages with owner to minimize downtown. Have parts and supplies for repairs available beforehand.

PART 2 - PRODUCTS

2.01 PARTS

A. Replacement parts shall be manufactured by the original equipment supplier or approved substitute. Any substitute shall be submitted to the engineer for approval prior to use.

PART 3 - EXECUTION

3.01 PANELBOARDS, SWITCHBOARDS, LOAD CENTERS

A. Visually inspect enclosures, bus, and all cable terminations. Report signs of cable overheating, insulation degradation, excessive moisture, rust, etc.
B. Clean, wire-brush, and paint all corroded and rusted areas with Rustoleum/ Gavanoleum to match existing.
C. Undo cable terminations, as necessary. Clean with approved electrical cleaner and reconnect to manufacturer's recommended torque.
D. Replace existing overcurrent protection devices with new devices of similar kAIC ratings. This applies to all overcurrent protection devices rated 100 Amps, or less, and more than 20 years old.
E. Switchboard fused switches are to be cycled on/ off several times to ensure operability. Lubricate pivot point(s) as necessary, and/ or as recommended by the manufacturer.
F. Provide fuse clamps for each fused switchboard switch exceeding 100 Amps.

3.02 TRANSFORMERS

A. Visually inspect enclosure, bus, or cable terminations. Report signs of cable overheating, insulation degradation, excessive moisture, rust, etc.
B. Clean, wire-brush, and paint all corroded and rusted areas with Rustoleum/ Gavanoleum to match existing.
C. Undo cable terminations, as necessary. Clean with approved electrical cleaner and reconnect to manufacturer's recommended torque.
D. Vacuum coils, core, and enclosure. Blow out with dry Nitrogen.
E. Megger transformer, report test results and return to operation.

3.03 SAFETY SWITCHES

A. Visually inspect enclosure, bus, or cable terminations. Report signs of cable overheating, insulation degradation, excessive moisture, rust, etc.
B. Clean, wire-brush, and paint all corroded and rusted areas with Rustoleum/ Gavanoleum to match existing.
C. Cycle switch(es) on/ off to ensure operability. Lubricate pivot point(s) as necessary as recommended by manufacturer.
D. Replace switch as necessary.

3.04 DIESEL GENERATOR SET

A. Visually inspect enclosure, bus, or cable terminations. Report signs of cable overheating, insulation degradation, excessive moisture, rust, etc.
B. Clean, wire-brush, and paint all corroded and rusted areas with Rustoleum/ Gavanoleum to match existing.
C. Tighten all control terminations.
D. Undo cable terminations, as necessary, clean with approved electrical cleaner, and reconnect to manufacturer's recommended torque.
E. Drain engine coolant. Fill with new coolant as recommended by manufacturer.
F. Drain engine oil. Replace filter. Fill with new oil as recommended by manufacturer.
G. Replace air filter, fuel filter, etc.
H. Drain diesel fuel. Fill with new fuel as recommended by manufacturer.
I. All diesel engine work shall be performed by a factory authorized technician.
J. Test to ensure proper operation under full load. Provide load bank of appropriate size.
K. Test to ensure proper operation of load transfer with existing automatic transfer switch and building load.

END OF SECTION

SECTION 26 05 00 - FIRE-STOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Refer to section 26 00 00 for requirements which are applicable to this section.
B. Refer to International codes.
C. Section includes:
   1. Through-penetration fire stops and smoke-stops for all fire-rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.

1.02 REFERENCES

A. American Society for Testing and Materials Standards (ASTM):
   1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
   2. ASTM E814: Standard Test method for Fire Tests of Through-Penetration Fire Stops.
B. Underwriters Laboratories, Inc.:
   1. UL 723 Surface Burning Characteristics of Building Materials
   2. UL 1479 Fire Tests of Through-Penetration Fire Stops.
C. UL Fire Resistance Directory:
   1. Through Penetration Fire Stop Devices (XHJI)
   2. Fire Resistive Ratings (BXUV)
   3. Through Penetration Fire Stop Systems (XHEZ)
   4. Fill, Void, or Cavity Material (XHHW)

1.03 DEFINITIONS

A. FIRE-STOPPING: The use of a material or combination of materials in a fire rated structure (wall or floor) where it has been breached to restore the integrity of the fire rating on that wall or floor.
B. SYSTEM: The use of a specific fire stop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s), constitutes a “System.”
C. BARRIER: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
D. THROUGH-PENETRATION: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
E. MEMBRANE-PENETRATION: Any penetration in a fire rated wall that breaches only one side of the barrier.
F. CONSTRUCTION GAPS: any gap, joint, or opening, whether static or dynamic, where the top of a wall may meet a floor; wall-to-wall applications; edge-to-edge floor configurations; floor-to-exterior wall; or any linear breach in a rated barrier. Where movement is required, the fire stopping system must comply with UL2079 for dynamic joints.

1.04 SUBMITTALS

NOTE: A “Certificate of Conformance” from the manufacturers listed in Section “2.02 ACCEPTABLE MANUFACTURERS,” is required with the “Submittal Package” to ensure that the material selected meets all

of the criteria of this specification as set forth in Section “1.05 QUALITY ASSURANCE.”

A. Submit manufacturer’s product literature for each type of fire-stop material to be installed. Literature shall indicate product characteristics, typical uses, performance and imitation criteria, and test data. Submittal shall comply with Section 26 00 00.
B. Material Safety Data Sheets (MSDS): Submit MSDS for each fire-stop product.
C. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which fire-stop materials will be used and thickness(es) for different hourly ratings.
D. Engineering Judgments: Submit manufacturer’s drawings for all non-standard applications where no UL tested system exists. All drawings must indicate the “Tested” UL system upon which the judgment is based to assess the relevance of the judgment to some, known performance.
E. Submit manufacturer’s installation procedures for each type of product.
F. Approved Applicator: Submit document from manufacturer wherein manufacturer recognizes the installer as qualified or submit a list of past projects to demonstrate capability to perform intended work.
G. Upon completion, installer shall provide written certification that materials were installed in accordance with the manufacturer’s installation instructions and details.

1.05 QUALITY ASSURANCE

A. Fire-stopping systems (materials and design):
    1. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
        a. The F rating must be minimum of one hour but not less than the fire resistance rating of the assembly being penetrated. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
    2. For joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.
B. Fire-stopping materials and systems must be capable of closing or filling through openings created by:
    1. The burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or.
    2. Deflection of sheet metal due to thermal expansion (electrical and mechanical duct work).
C. Fire-stopping material shall be asbestos and lead-free and shall not incorporate nor require the use of hazardous solvents.
D. Fire-stopping sealants must be flexible, allowing for normal pipe movement.
E. Fire-stopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
F. Fire-stopping materials shall be moisture resistant and may not dissolve in water after curing.
G. All fire-stopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
H. Installation of fire-stopping systems shall be performed by a contractor (or contractors) trained or approved by the fire-stop manufacturer.
I. Material used shall be in accordance with the manufacturer’s written installation instructions.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label and mixing and installation instructions as applicable.
B. Store materials in the original, unopened containers or packages and under conditions recommended by the manufacturer.
C. All fire-stop materials will be installed prior to expiration of shelf life.

1.07 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
B. Contractor shall verify the condition of the substrates before starting work.
C. Weather Conditions: Do not proceed with installation of fire-stop materials when temperatures fall outside the manufacturer's suggested limits.
D. Care shall be taken to ensure that fire-stopping materials are installed so as not to contaminate adjacent surfaces.

1.08 SEQUENCING

A. Schedule fire-stopping after installation of penetrants but prior to concealing the openings.
B. Fire-stopping shall precede gypsum board finishing.

1.09 PROTECTION

A. Where fire-stopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.01 GENERAL

A. Fire-stopping materials and systems shall meet the requirements specified herein.
B. Architect must approve in writing any alternates to the materials and system specified herein.
C. All fire-stop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
D. For applications where combustible penetrants are involved, i.e., insulated, and plastic pipe, a suitable intumescent material must be used.

2.02 ACCEPTABLE MANUFACTURERS

NOTE: Inclusion of materials in this specification does not indicate that the listed products have been evaluated for conformance to this specification. Therefore, the user/ contractor must certify in the submittal package, with a "Certificate of Conformance" from the manufacturers listed below, that the material selected meets all of the criteria set forth in Section "1.05 QUALITY ASSURANCE" of this specification.

A. Specified Technologies, Inc. /GE Pensil® (STI), Somerville, NJ 08876, Phone: (800) 992-1180.

B. 3M Fire Protection Products, St. Paul, MN

2.03 MATERIALS

A. Intumescent Fire-stop Sealants and Caulks:
   1. STI SpecSeal SSS100
   2. 3M Fire Barrier Caulk CP25WB+
B. Latex Fire-stop Sealant
   1. STI SpecSeal LC150 Sealant
C. Elastomeric Water-Based Sealant
   1. STI SpecSeal ES100 Elastomeric Sealant
D. Silicone Fire-stop Sealants and Caulks:
   1. STI SpecSeal Pensil 300
   2. 3M Fire Barrier Silicone Sealants
E. Fire-stop Putty:
   1. STI SpecSeal Fire-stop Putty Bars and Pads
   2. 3M Fire Barrier Moldable Putty
F. Fire-stop Collars:
   1. STI Spec Seal Fire-stop Collars
   2. 3M Fire Barrier PPD's.
G. Wrap Strips:
   1. SpecSeal Wrap Strip
   2. 3M Fire Barrier FS195 Wrap Strip.
H. 2-Part Silicone Fire-stop Foam:
   1. STI SpecSeal Pensil 200
   2. 3M Fire Barrier 2001 Silicone Foam.
I. Fire-stop Mortar:
   1. STI SpecSeal Mortar.
J. Fire-stop Pillows:
   1. STI SpecSeal Pillows
K. Elastomeric Spray:
   1. STI SpecSeal AS Elastomeric Spray
L. Composite Board:
   1. 3M Barrier Sheet Material
M. Accessories:
   1. Forming/Damming Materials: Mineral fiberboard or other type as per manufacturer recommendation.

PART 3 - EXECUTION

CONDITIONS REQUIRING FIRE-STOPPING

A. General:
   1. Provide fire-stopping for conditions specified whether fire-stopping is indicated or not, and if indicated, whether such material is designed as insulation, safing, or otherwise.
B. Through-Penetrations:
   1. Fire-stopping shall be installed in all open penetrations and in the annular space in all

penetrations in any bearing or non-bearing fire-rated barrier.

C. Membrane-Penetrations:
   1. Where required by code, all membrane-penetrations in rated walls shall be protected with fire-stopping products that meet the requirements of third-party time/ temperature testing.

D. Construction Joints/ Gaps:
   1. Fire Stopping shall be provided:
      a. Between the edges of floor slabs and exterior walls.
      b. Between the tops of walls and the underside of floors
      c. In the control joint in masonry walls and floors
      d. In expansion joints.

E. Smoke-Stopping:
   1. As required by the other Sections, smoke-stops shall be provided for through-penetrations, membrane-penetrations, and construction gaps with a material approved and tested for such application.

3.02 EXAMINATION

A. Examine the areas and conditions where fire-stops are to be installed and notify the architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect.

B. Verify that environmental conditions are safe and suitable for installation of fire-stop products.

C. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of fire-stops.

3.03 INSTALLATION

A. General:
   1. Installation of fire-stops shall be performed by an applicator/ installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
   2. Apply fire-stops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
   3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
   4. Seal holes and penetrations to ensure an effective smoke seal.
   5. In areas of high traffic, protect fire-stopping materials from damage. If the opening is large, install fire-stopping materials capable of supporting the weight of a human.
   6. Insulation types specified in other sections shall not be installed in lieu of fire-stopping material specified herein.
   7. All combustible penetrants (e.g., non-metallic pipes or insulated metallic pipes) shall be fire-stopped using products and systems tested in a configuration representative of the field condition.

B. Dam Construction:
   1. When required to properly contain fire-stopping materials within openings damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Non-combustible damming materials may be left as a permanent component of the fire-stop system.

3.04 FIELD QUALITY CONTROL

1. Prepare and install fire-stopping systems in accordance with manufacturer's printed instructions and recommendations.
2. Follow safety procedures recommended in the Material Safety Data Sheets.
3. Finish surfaces of fire-stopping which are to remain exposed in the completed work to a uniform and level condition.
4. All areas of work must be accessible until inspection by the applicable Code Authorities.
5. Correct unacceptable fire-stops and provide additional inspection to verify compliance with this specification.

3.05 CLEANING

1. Remove spilled and excess materials adjacent to fire-stopping without damaging adjacent surfaces.
2. Leave finished work in neat, clean condition with no evidence of spill overs or damage to adjacent surfaces.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING SYSTEMS: GENERAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of system described in other Sections.
B. Related Sections include the following:
   1. 26 41 13 - LIGHTNING PROTECTION for additional grounding and bonding materials.

1.03 SUBMITTALS

A. Product Data - For the following:
   1. Ground rods.
   2. Chemical rods.
1.04 Qualification Data: For firms and persons specified in 1.05 QUALITY ASSURANCE Article.

A. Field Test Reports: Submit written test reports to include the following:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise on-site testing specified in PART 3 - EXECUTION.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   1. Comply with UL 467.
C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Grounding Conductors, Cables, Connectors, and Rods:
      a. Chance/ Hubbell
      b. Copperweld Corp.
      c. Erico Inc.; Electrical Products Group.
      d. Framatome Connectors/Burndy Electrical
      e. Galvan Industries, Inc.
      f. Ideal Industries, Inc.
      g. Kearney/ Cooper Power Systems.
      h. Korns: C.C. Korns Co.; Division of Robroy Industries.
      i. Lyncole XIT Grounding.
      j. O-Z/Gedney Co.; a business of the EGS Electrical Group.\
      k. Raco, Inc.; Division of Hubbell.
      l. Salisbury: W.H. Salibury & Co.
      m. Superior Grounding Systems, Inc.
      n. Thomas & Betts, Electrical

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 27 00.
B. Material: Aluminum, copper-clad aluminum, and copper.
C. Equipment Grounding Conductors: Insulated with green-colored insulation.
D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two band of yellow.
E. Grounding Electrode Conductors: Stranded cable.
F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
G. Bare Copper Conductors: Comply with the following:
   1. Solid Conductors: ASTM B 3.
   2. Assembly of stranded Conductors: ASTM B8.
   3. Tinned Conductors: ASTM B33.
H. Copper Bonding Conductors: As follows:
   1. Bonding Cable: 28 kcmil, 14 strands of #17 AWG copper conductor, 1/4” Ø.
   2. Bonding Conductor: #4 or #6 AWG, stranded copper conductor.
   3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules: 1-5/8" wide and 1/16" thick.
   4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules: 1-5/8" wide and 1/16" thick.
I. Aluminum Bonding Conductors: As follows:
   1. Bonding Cable: 10 strands of #14 AWG aluminum conductor 1/4" Ø.
   2. Bonding Conductor: #4 or #6 AWG, stranded aluminum conductor.
   3. Bonding Jumper: Aluminum tape, braided bare aluminum conductors, terminated with aluminum ferrules: 1-5/8" wide and 1/16" thick.
J. Ground Conductor and Conductor Protector for Wood Poles: As follows:
   1. #4 AWG aluminum, soft-drawn copper conductor.
   2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, cypress, or cedar.
K. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

2.03 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes and combinations of conductors and connected items.
B. Bolted Connectors: Bolted-pressure type connectors, or compression type.
C. Welded Connectors: Exothermic-welded type, in kit form, and selected per

2.04 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel.
B. Ground Rods: Section type; copper-clad steel.
   1. Size: 5/8" Ø.
C. Chemical Electrodes: Copper tube, straight or L-shaped, filled with nonhazardous chemical salts, terminated with a #4/0 bare conductor. Provide backfill material recommended by manufacturer.

PART 3 - EXECUTION

3.01 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
B. In raceways, use insulated equipment grounding conductors.
C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.
D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
E. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
   1. Use insulated spacer; space 0'-1" from wall and support from wall 0'-6" above finished floor, unless otherwise indicated.
   2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.
F. Underground Grounding Conductors: Use tinned copper conductor, #2/0 AWG minimum. Bury at least 2'-0" below grade or bury 1'-0" above duct bank when installed as part of the duct bank.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
B. Install equipment grounding conductors in all feeders and circuits.
C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:
   1. Feeders and branch circuits.
   2. Single-phase motor branch circuits.

3. Three-phase motor branch circuits.

D. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

E. Bond metal parts, motor frames, fittings, plumbing pipes, drains, metal conduit, metal surfaces within 5'-0", and all electrical devices and controls within 5'-0".

F. Motors shall be grounded by means of a grounding conductor in the same raceway with the motor feeder connected to the grounding bushing at the motor terminal box and the ground bus in the motor control center or to the incoming conduit grounding bushing of an individually mounted motor starter.

3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.04 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
   1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
   2. Make connections with clean, bare metal at points of contact.
   3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
   4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
   5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For #8 AWG and larger, use pressure-type grounding lugs. #10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
   1. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

F. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.05 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
   1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
   2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81. (Ensure that the test is performed with all ground-to-neutral bands broken. The grounding system must be completely isolated for the test to be valid.)
   3. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 27 00 - BASIC MATERIALS AND EQUIPMENT - NM and NMC

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to Section 26 00 00 for additional requirements of this section.
B. Refer to NECA 1-2000 for general installation requirements.
C. National Electrical Code (NFPA 70) (NEC)

1.02 SHOP DRAWINGS

A. Provide shop drawings of all switches and receptacles in this section.
B. Provide shop drawings of all specified items unless waived by the engineer.

PART 2 - PRODUCTS

2.01 NM, NMC CABLE

A. NEC; Article 334. NM: Flame and Moisture Resistant. NMC: Flame, moisture, and corrosion resistant.
B. Applications: Permitted for both exposed and concealed work in dry locations. Shall be protected from physical damage. Not permitted in any dwelling or structure exceeding three floors above grade.

2.02 RIGID STEEL CONDUIT

A. Steel, zinc coated Federal Specification WW-C-581d, ANSI C801. Fittings of malleable iron.

2.03 ELECTRICAL METALLIC TUBING (EMT)

A. Galvanized steel, UL labeled, Federal Specification ANSI/UL797, ANSI C80.3. Fittings threadless compression type. Installation in accordance with Article 358 of NEC and UL General Information Card #FJMX. EMT shall be as manufactured by Allied Tube & Conduit Corp. or approved equal.

2.04 FLEXIBLE METALLIC CONDUIT

A. Federal Specification AA-55810 Hubbell, Allied Tube and Conduit Corporation, AFC, Electri-flex Company.

2.05 RIGID SCHEDULE 40 PVC CONDUIT

A. UL 651, ANSI/NEMA TC-2, Federal Military Spec. WC-1094A, UL listed for use in accordance with Article 352 of National Electrical Code. 90°F Wire Rated and Sunlight Resistant. Carlon Schedule 40 Electrical Conduit.

2.06 CONDUCTORS

A. Type; THHN, 98% conductivity copper, 600VAC, dry locations. Type THWN for wet locations. Conductors shall be UL listed.
B. Equipment terminations for circuits rated 100 Amps or less (#14 AWG - #1 AWG) shall be rated 60°C (140°F). Equipment termination for circuits rated over 100 Amps (#1/0 or larger) shall be rated 75°C (167°F). Refer to NEC for allowable exceptions. 90°C (194°F) rated conductors shall be used as indicated on the drawings or as indicated within these specifications.
C. Solid copper conductors for #10 and #12 wire size. #8 and larger shall be stranded copper.
D. All conductors shall be color coded as follows:

120/208 Volt Systems

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	Grey or Natural White

E. Minimize size conductor shall be #12 AWG except that #14 AWG shall be used for control wiring. All circuit conductors shall be run in the same raceway system.
F. A grounding conductor shall be provided to each electrical device in accordance with the NEC.
G. Conductor sizes shall be as shown on drawings and/or specified in this specification.
H. Conductors shall not be installed in raceways until construction is advanced to allow conductors to be installed completely without damage to conductors and there is not possibility of water or other contaminants entering the raceway system. Conductors shall be installed between convenient terminating points.
I. An approved pulling compound shall be used to assist in pulling of conductors.

2.07 JUNCTION BOXES

A. Galvanized steel, accessible, Keystone, Hubbell, Penn Panel and Box Company or approved equal.

2.08 OUTLET AND SWITCH BOXES

A. Galvanized steel, Crouse Hinds Co., Steel City Div, RACO Inc. or approved equal.

2.09 PLATES

A. .040” thick metal brushed stainless steel.
B. Ivory painted steel.

2.10 RECEPTACLES

A. Duplex, three wire grounding type. 20 Amp., 120VAC, Federal Specification WC 896 596 Impact Resistant, Ivory, Leviton 5362, Cooper Wiring Devices, Pass & Seymour, Hubbell, or approved equivalent.

* Those receptacles installed on the emergency system shall be clearly identifiable as distinct from normal system receptacles.
(RED)

2.11 GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES

A. Furnish and install receptacles with ground fault circuit interrupters as indicated on plans and specifications.
B. Receptacles shall be NEMA 5-20R configuration with 120VAC 20 ampere circuit rating and ivory in color.
C. GFCI Receptacle shall have Safe Lock protection.
D. All receptacles shall be of such depth as to permit mounting in outlet boxes 1" or greater in depth without the use of spacers. Units shall have line and load terminal screws such that connection to load terminals will provide ground fault protection for other receptacles or loads connected to these terminals.
E. All receptacles shall accept standard duplex wall plates.
F. All receptacles shall be noise suppressed to reduce nuisance tripping and shall be UL listed.
G. Exterior receptacles shall be provided with weatherproof; in-use covers.
H. Pre-wired pigtail connectors that accommodate Federal Specification receptacles are approved and shall be crimped and welded terminal right-angle application within the connector.
I. Receptacle shall be Federal Specification, WC896 596 compliant. Marking should be clearly identifiable on face or strap.
J. Manufacturers: Leviton- 6899 RGF15, RGF20, Hubbell, Cooper Wiring Devices, Pass & Seymour.

2.12 TAMPER RESISTANT RECEPTACLES

A. UL Listed, Federal Specification WC 896 596 Tamper-Resistant, in compliance with NEC 406.11 and 517.18 (C), three wire plug. The design of the tamper-resistant receptacles may not incorporate any switching mechanisms. Available in both 15 and 20 Amp, 125VAC, 2-pole, 3-wire grounding, in standard duplex configurations, as well as lighted face and isolated ground versions, as manufactured by Cooper Wiring Devices, or equivalent by Pass & Seymour, Leviton, or Hubbell. (For pediatric and psychiatric locations).

2.13 ISOLATED GROUNDING TYPE RECEPTACLES

A. Type: 20 Amp. 125VAC, Heavy Duty Grade, Grounded contacts in receptacle face isolated from mounting strap, Green dot and Orange triangle on each face. UL 498, Federal Specification WC 896 596. Ivory wall plates. Manufacturer: nylon, stamped “Isolated Ground” by Hubbell, Leviton, Cooper Wiring Devices, Pass & Seymour.

2.14 RECEPTACLES - FLOOR OUTLET

A. Solid brass covered plate with matching flush fitting brass cap. Receptacle made of durable thermoplastic. Supplied with foam rubber gasket. O-ring and metal 18" cubic box. In compliance with UL 498 and Federal Specification WC 896 596. Acceptable manufacturers: Cooper Wiring Devices, Pass & Seymour, Hubbell, Leviton.

2.15 SWITCHES

A. Heavy duty, toggle handles, quiet, Ivory, 20 Amp, 120-277VAC, Federal Specification WC 596 WS 896, Leviton CS 120-2, Cooper Wiring Devices, Pass & Seymour, Hubbell.

2.16 ROCKER SWITCHES

A. 20 Amp., 120-277VAC, Federal Specification WC 596 WS 896, specification grade, Ivory, quiet type,

Leviton 5621-2, 5622-2, 5623-2 or 5624-2 or equivalent by Cooper Wiring Devices, Pass & Seymour, Hubbell.

2.17 LIGHTED ROCKER SWITCHES

A. 20 Amp, 120-277VAC, Federal Specification WC 596 WS 896, specification grade, ivory, quiet type, lighted rocker handles, Leviton 5628-2, 5638-2, 5629-2 or 5639-2 or equivalent by Cooper Wiring Devices, Pass & Seymour, Hubbell.

2.18 TIME DELAY SWITCH

A. UL Listed, 120V
On: Light on and Fan on
Snap off: Light off and Fan runs for 0-10 min. adjustable.

2.19 AC MOTOR RATED SWITCH

A. 30 Amp and/ or 40 Amp, 600VAC rated.
B. Double pole or triple pole, single throw.
C. UL 508, UL 94 (flammability) Listed.
D. All molded parts are made of thermoplastic material to assure superior resistance to repeated impact, chemical degradation, extreme temperature fluctuations, tracking and arcing.
E. Positive-contact design enhances fast make/ slow break mechanism by minimizing bounce and arcing upon contact closure and teasing upon separation.
F. Free-travel toggle design protects closed contacts from accidental disengagement and contact teasing.
G. Silver alloy contacts provide maximum conductivity and prolonged service life.
H. Side and back wire terminal screws accept up to #10 AWG solid copper wire.
I. For standard #8 AWG wire, remove terminal clamp and use ring terminal.
J. Oversized #10 AWG, triple-combination, vibration-resistant terminal screws.
K. Mounting yoke is made from nickel-plated brass for superior corrosion resistance.
L. Insulating barriers between terminal screws provide isolation from each phase.
M. Devices are permanently marked with catalog number, amperage, voltage, and horse-power ratings to assist with identification.
N. Large toggle provides positive actuation, even when operated with gloved hand.
O. Leviton MS302 (30 Amp, 2-Pole), MS 303 (30 Amp, 3-Pole), MS402 (40 Amp, 2-Pole) or MS403 (40 Amp, 3-Pole) or equivalent by Cooper Wiring Devices, Pass & Seymour, Hubbell.

2.20 DIMMER SWITCHES

A. UL listed, full range 2000-watt 120VAC, slide control, Lutron NT-2000 or equivalent by Leviton, Cooper Wiring Devices, Pass & Seymour, Hubbell.

2.21 RECESSED FLOOR BOX (CONCRETE FLOOR)

A. One, two, or three gang boxes, cast iron for on or below grade, stamped steel for above grade.
B. Fully adjustable before and after concrete pour.
C. Shallow box as necessary.
D. Removable dividers as necessary for multi-service applications.
E. One, two, or three gang cover plates; Carpet, tile, or brass as per application.

F. Walker Wiremold Omnibox Multiservice Floor Box series.
G. Acceptable Manufacturers: Wiremold, Hubbell, Thomas & Betts, Crouse Hinds.

2.22 RECESSED FLOOR BOX (WOOD FLOOR)

A. One, two, or three gang boxes, cast iron for on or below grade, stamped steel for above grade.
B. Removable dividers as necessary for multi-service applications.
C. One, two, or three gang cover plates; Carpet, tile, or brass as per application.
D. Walker Wiremold Wood Floor Box series.
E. Acceptable Manufacturers: Wiremold, Hubbell, Thomas & Betts, Crouse Hinds.

2.23 RAISED FLOOR BOX (8"x6", OR 8"x10")

A. The panel opening shall be (8"x6") (8"x10") and have an overall module depth of 5".
B. The box lid shall be constructed of polycarbonate material, available in standard colors of black, brown, and gray. The lid shall provide removable cable guard for egress of power and communication workstation cables. The cable guards shall hold workstation cables in place with the lid either in the open or closed position.
C. The trim flange shall be constructed of polycarbonate material and have a minimum overall dimension of 8-3/4"x6-3/4". It shall be available for either carpet or tile floor applications.
D. The wiring chamber shall provide a minimum of three separate compartments to accommodate a combination of both power and communication wiring.
E. The box shall be secured to the raised floor using two locking tabs. The locking tabs shall be integral to the box and adjusted by use of their locking screws.
F. The raised floor box shall meet UL Standard UL514A, and shall bear the Listing Mark.
G. Wiremold Floorsource AF Series.
H. Acceptable Manufacturers: Wiremold, Hubbell, Thomas & Betts, or approved equivalent.

2.24 MULTISERVICE FLUSH POKE-THRU (4" FLOOR CORE)

A. Flush poke-thru with four, Category 5 communications jacks and power.
B. Communication adapter for protection of Category 5 cables.
C. EMI/ RFI shielded divider, UL recognized.
D. Manufacturers furnish 20 Amp, isolated grounding specification grade duplex receptacle.
E. 2-hour fire rating, UL Listed.
F. Grommets for unused data jack parts (coordinate with data communications contractor).
G. Wiremold RC2001 Category 5 Flush Poke-thru.
H. Acceptable Manufacturers: Wiremold, Hubbell, Thomas & Betts, approved equivalent.

2.25 THREE SERVICE FURNITURE FEED POKE-THRU (3" FLOOR CORE)

A. Flush poke-thru for telephone, data, and power (up to 10 wire) feeds to furniture partitions.
B. Communication adapter for protection of communications cables.
C. Up to 4-hour UL Listed fire rating as indicated on drawings or specifications.
D. Wiremold RC700 - 6A series flush poke-thru.
E. Acceptable manufacturers: Wiremold, Hubbell, Thomas & Betts.

2.26 MULTISERVICE RECESSED WALL BOX (FLAT SCREEN TVs, MONITORS)

A. Three gang box, plastic housing, white finish. Flush mount appearance allows for snug-to-wall

placement of flat-screen TV or monitor.
B. Surge-protective duplex power outlet and up to 12 multimedia connections.
C. Position either line voltage or low voltage devices in all three openings.
D. Low voltage connectors offer both terminated and pull-through capability so plugs, and multimedia connections stay recessed behind the surface of the wall.
E. Accepts standard TP wall plate.
F. Legrand TV3WTVSSW. (ACTS standard)
G. Acceptable Manufacturers: Hubbell, Thomas & Betts.

2.27 AC WIRED SMOKE ALARM

A. Dual Sensor (Photo Electric and Ionization)
B. 120VAC and 9V (ten-year battery) battery back-up.
C. 85 dB at 10’-0” alarm.
D. Five-year warranty, UL Listed.
E. Manufactured by Kidde P12000, BRK Electronics, First Alert or approved equivalent.

2.28 AC WIRED STROBE LIGHT

A. Bright Candela Strobe Light, flash rate 1Hz
B. 120VAC
C. Dual Mode (smoke and heat detectors cause steady flash; CO detectors cause intermittent flash)
D. Five-year warranty, UL Listed.
E. Manufactured by Kidde SL177i, BRK Electronics, First Alert or approved equivalent.

2.29 AC WIRED CARBON MONOXIDE ALARM

A. Electrochemical sensor.
B. 120VAC and 9V (ten-year battery) battery back-up.
C. 85 dB at 10’-0” alarm.
D. Five-year warranty.
E. Manufactured by Kidde KN-COB-IC, BRK Electronics, First Alert or approved equivalent.

2.30 AC WIRED COMBINATION CARBON MONOXIDE AND SMOKE ALARM

A. Photoelectric sensor
B. Carbon Monoxide sensor
C. 120VAC and 9V (ten-year battery) battery back-up.
D. 85 dB at 10’-0” alarm.
E. Five-year warranty, UL Listed.
F. Manufactured by Kidde 21010408-N, BRK Electronics, First Alert or approved equivalent.

PART 3 - EXECUTION

3.01 WIRING DEVICES

A. Lighting outlet boxes to have fixture studs - 3/8”.

B. Exterior boxes shall be gasketed and watertight.
C. Switch and device plates to be mounted with all four corners touching adjacent surface.
D. All devices to be installed level, square, true, and plumb.
E. Switch plates and receptacles shall not be placed back-to-back in adjacent rooms. Offset locations a minimum of 3” to restrict noise transfer. This shall also apply to TV outlets, telephone outlets, and data outlets.
F. All devices on opposite side of a fire resistance rated wall assembly are to be separated by a horizontal distance of not less than 2‘-0”.
G. Ground fault circuit interrupters shall be provided on all outdoor receptacle circuits, receptacle circuits within toilet and bathrooms, areas in close proximity to water, and wherever else indicated on the drawings or required by Code. While-in-use type covers are to be used in exterior wet locations.
H. Tamper resistant receptacles are to be installed in day care areas, pediatric health care, psychiatric care as well as where indicated on the drawings. Refer to NEC 406.11 and 517.18 (C).
I. Arc fault circuit interrupters shall be provided on all 15 Amp and 20 Amp receptacle circuits in dwelling unit bedrooms.
J. AC smoke alarms within individual dwelling units are to be interconnected to allow annunciation of all devices in the event of an alarm signal from any one device. This system is to be tested in accordance with applicable code.
K. Within accessible dwelling units the AC smoke alarms, and the AC strobe lights are to be interconnected to allow visual annunciation of all devices in the event of an alarm signal from any one device. This system is to be testing in accordance with applicable code.
L. Dimmer switch devices shall be appropriately sized for derating when a minimum of two or more are ganged together in a common wall box.

3.02 WIRING METHODS

A. Exposed interior wiring; EMT. Any raceway that is to be exposed in a finished area is to be coordinated with the architect/ engineer prior to installation.
B. Concealed wiring above suspended ceilings and in stud spaces; Type NM cable.
C. Wiring in concrete slabs or decks; PVC conduit
D. Exposed exterior wiring; Intermediate rigid conduit.
E. Wiring below concrete slabs in earth; PVC conduit. * Provide GRS conduit sweep elbow through concrete slab.
F. Service wiring; rigid steel conduit
G. Concrete encasement; Secondary service from transformers to buildings.

3.03 GROUNDING

A. All electrical equipment and systems shall be grounded.
B. Grounding system shall consist of a ground bus bar connected to a driven ground rod. Utilize ground type clamp fitting.
C. All connections to conduit, equipment and devices shall be made with compression type connections.
D. The grounding system shall comply with the NEC.
E. All outside lighting fixtures and poles shall be grounded.
F. All equipment and devices shall be grounded in accordance with the manufacturer’s recommendations.
G. The ground system shall have a resistance of 25 Ohms or less in compliance with the NEC.
H. Furnish a ground system test report at the completion of the work.
I. Substation area grounding shall be in accordance with local utility company standards.

3.04 POWER WIRING

A. Wire between motors, starters, disconnects and source.
B. Verify proper motor rotation.
C. Furnish and install weatherproof disconnects, as indicated.
D. All panel feeders shall be run in EMT raceway system.
E. All wiring to roof top units, fans, equipment, and HVAC units shall be installed complete between panels and disconnect switches.
F. Disconnects shall be mounted adjacent to electrical and mechanical equipment. Indoor installations shall utilize NEMA 1 enclosures. Outdoor installations shall utilize NEMA 3R enclosures.

END OF SECTION

SECTION 26 28 16 - SAFETY SWITCHES - GENERAL DUTY

*** Light commercial.**

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to section 26 00 00 for requirements which are applicable to this section.
B. Refer to NFPA and in particular National Electrical Code.
C. Refer to NEMA, UL, and IEEE Standards.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to furnish and install and place into operation safety switches where indicated on the drawings and specified herein.

1.03 SUBMITTALS

A. Submit manufacturer's shop drawings of devices.

1.04 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's warranty requirements.
B. Install systems and equipment in accordance with the National Electrical Code and local codes having jurisdiction.
C. Provide adequate supervision of labor force to see that installations are correct.

PART 2 - PRODUCTS

2.01 GENERAL DUTY SAFETY SWITCHES

A. APPLICATION DATA
30-600 amperes
240 volts ac
NEMA 1 - General Purpose, painted sheet steel
NEMA 3R - Rainproof, painted galvanized steel
Standard - Non time delay fuse
Maximum - Time delay (dual element) fuse
B. CONSTRUCTION
Visible blades
Handle attached to box, not cover
Handle position indicates "ON" or "OFF"
Top hinged cover on NEMA 3R

Operating mechanism is quick-make, quick-break
Plated current carrying parts
Provisions for padlocking the switch in the "OFF" position
Class R fuse kits for field installation

C. NEUTRAL AND GROUNDING
Provisions for field installation of insulated, groundable neutral
Ground kits for field installation

D. TERMINALS
UL listed for Al or Cu wires
UL listed for 60 deg. or 75 deg. C. wires

E. FUSE CLIPS
Spring reinforced
Plated

F. APPLICATION
Fusible - Class H or Class R
Not fusible

G. NEMA STANDARDS
KS1 - 1975

H. UL LISTING
UL 98 Enclosed Switches
Maximum HP ratings

I. UL LISTED SHORT CIRCUIT RATING:
100,000 rms symmetrical amperes with proper rejection kit and Class R fuses 10,000 rms symmetrical amperes with Class H fuses

J. Acceptable Manufacturers:
1. Siemens
2. Cutler Hammer
3. ABB Group
4. Square D

PART 3 - EXECUTION

3.01 SAFETY SWITCHES

A. Furnish and install safety switches on all motors which do not have integral equipment disconnect devices, local starters and/or where indicated on the drawings.
B. Furnish and install fused safety switches where indicated on the drawings.
C. Safety switches shall be installed to meet the area classification as to standard, hazardous, rainproof, etc.
D. Safety switches shall be installed securely to building structure or be provided with supplemental support steel such as angle iron or uni-strut when required to locate on other than building structure.
E. All safety switches shall be grounded.

END OF SECTION

SECTION 26 28 17 - SAFETY SWITCHES - HEAVY DUTY

*** Industrial, commercial, all 480 V applications.**

PART 1 - GENERAL

1.01 REFERENCE

A. Refer to section 26 00 00 for requirements which are applicable to this section.
B. Refer to NFPA and in particular the National Electrical Code.
C. Refer to NEMA, UL, and IEEE Standards.

1.02 WORK INCLUDED

A. Provide all labor, material, equipment, and supervision necessary to furnish and install and place into operation safety switches where indicated on the drawings and specified herein.

1.03 SUBMITTALS

A Submit manufacturer's shop drawings of devices.

1.04 QUALITY ASSURANCE

A. Verify that all equipment is installed in accordance with the manufacturer's warranty requirements.
B. Install systems and equipment in accordance with the National Electrical Code and local codes having jurisdiction.
C. Provide adequate supervision of labor force to see that installations are correct.

PART 2 - PRODUCTS

2.01 HEAVY DUTY SAFETY SWITCHES

A. APPLICATION DATA
   1. 30-1200 amperes
   2. 600 volts AC for 480 V applications
   3. 240 Volt-AC for 240 V and 208 V applications.
   4. NEMA 1 - General Purpose, painted sheet steel
   5. NEMA 3R - Rainproof, painted galvanized steel
   6. Maximum - Time delay (dual element) fuse
B. CONSTRUCTION
   1. Visible blades
   2. Handle attached to box, not cover
   3. Handle position indicates "ON" or "OFF"
   4. Top hinged cover on NEMA 3R
   5. Operating mechanism is quick-make, quick-break

6. Plated current carrying parts
7. Provisions for padlocking the switch in the "OFF" position
8. Class R fuse standard for 30 - 600 Amp switches.
9. Class L fuses standard for 800-1200 Amp switches.

C. NEUTRAL AND GROUNDING
Provisions for field installation of solid neutral assembly.
Ground kits for field installation

D. TERMINALS
UL listed for Al or Cu wires
UL listed for 60 deg. or 75 deg. C. wires
Meets UL 486 B requirements

E. FUSE CLIPS
Spring reinforced
Plated

F. APPLICATION
Fusible - Class R or Class L as indicated above
Not fusible

G. NEMA STANDARDS
KS1 - 1975

H. UL LISTING
UL 98 Enclosed Switches
Maximum HP ratings

I. UL LISTED SHORT CIRCUIT RATING:
200,000 RMS Symmetrical Amperes with proper rejection kit and Class R fuses.

J. Acceptable Manufacturers:
1. Siemens
2. Cutler Hammer
3. ABB Group.
4. Square D

PART 3 - EXECUTION

3.01 SAFETY SWITCHES

A. Furnish and install safety switches on all motors which do not have integral equipment disconnect devices, local starters and/or where indicated on the drawings.
B. Furnish and install safety switches where indicated on the drawings.
C. Safety switches shall be installed to meet the area classification as to standard, hazardous, rainproof, etc.
D. Safety switches shall be installed securely to building structure or be provided with supplemental support steel such as angle iron or uni-strut when required to locate on other than building structure.
E. All safety switches shall be grounded.

END OF SECTION

SECTION 26 41 13 - LIGHTNING PROTECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to this Section.

1.02 SUMMARY

A. This Section includes lightning protection for expanding the existing building system as required by the lightning specialist engaged by the electrical contractor.
B. Provide a complete design layout with details for review.

1.03 SUBMITTALS

A. Product Data: For air terminals and mounting accessories.
B. Shop Drawings: Detail lightning protection system, including air-terminal locations, conductor routing and connections, and bonding and grounding provisions. Include indications for use of raceway and data on how concealment requirements will be met.
C. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include data on listing or certification by nationally recognized testing laboratory (NRTL) or trade association.
D. Certification, signed by Contractor, that roof adhesive for air terminals is approved by manufacturers of both the terminal assembly and the single-ply membrane roofing material.
E. Field inspection reports indicating compliance with specified requirements.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is NRTL listed or who is certified by LPI as a Master Installer/ Designer.
B. Listing and Labeling: As defined in NFPA 780, Article 2-2, "Definitions."
C. Provide UL Master Label.
D. Provide LPI certification of system.
E. Provide ETL Master Label indicating system complies with specified requirements.

1.05 COORDINATION

A. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures, and building materials, metal bodies requiring bonding to lightning protection components, building finishes, and roof systems.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. A-C Lightning Security, Inc.
   2. Automatic Lightning Protection.
   3. Harger Lightning Protection, Inc.
   4. Heary Bros. Lightning Protection Co. Inc.
   5. Independent Protection Company, Inc.
   6. Robbins Lightning, Incorporated.
   7. Thompson Lightning Protection, Inc.
   8. Warren Lightning Rod Company
   9. Preferred Lightning Protection
   10. East Coast Lightning Equipment, Inc.

2.03 LIGHTNING PROTECTION SYSTEM COMPONENTS

A. Comply with UL 96.
B. Select material classification of NFPA 780; see Table 2 in the Evaluations. NFPA requires Class II air terminals to be solid.
C. Roof-Mounting Air Terminals: NFPA Class I or II as appropriate, solid copper, unless otherwise indicated.
   1. Single-Membrane, Roof-Mounting Air Terminals: Designed for single-membrane roof materials.
D. Stack-Mounting Air Terminals: Solid copper.
E. Ground Rods, Ground Loop Conductors, and Concrete-Encased Electrodes: Comply with Division 26 Section "GROUNDING AND BONDING" and standards referenced in this Section.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install lightning protection components and systems according to UL 96A, LPI-175, and NFPA 780.
B. Conceal the following conductors:
   1. System conductors.
   2. Down conductors.
   3. Interior conductors.
   4. Conductors within normal view from exterior locations at grade within 200’-0” (60 m) of the building.
   5. Notify Architect at least 48 hours in advance of inspection before concealing lightning protection components.
C. Cable Connections: Use approved exothermic-welded connections for all conductor splices and connections between conductors and other components, except those above single-ply membrane roofing.
D. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.
E. Bond extremities of vertical metal bodies exceeding 60’-0” (18 m) in length to lightning protection

components.

F. A counterpoise installation based on requirements in Division 26 Section "GROUNDING AND BONDING" may be used as a ground loop required by NFPA 780, provided counterpoise conductor meets or exceeds minimum requirements in NFPA 780.
   1. Bond ground terminals to counterpoise conductor.
   2. Bond grounded metal bodies on building within 12’-0” (3.6 m) of ground to counterpoise conductor.
   3. Bond grounded metal bodies on building within 12’-0” (3.6 m) of roof to interconnecting loop at eave level or above.

G. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at 60’-0” (18 m) intervals.

3.02 CORROSION PROTECTION

A. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

B. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

3.03 FIELD QUALITY CONTROL

A. Periodic Inspections: Engage an LPI inspector to perform periodic inspections during construction and at its completion, according to LPI-177.

B. UL Inspection: Apply for inspection by UL as required to obtain a UL Master Label for system.

C. ETL Inspection: Engage an ETL inspector to inspect completed system for compliance with specified requirements.

END OF SECTION

CONTRACT FOR CONSTRUCTION

This AGREEMENT is entered into as of the ___ day of _____ , _____ , between

The College: The College of New Jersey ("TCNJ" or the "College")
PO Box 7718
2000 Pennington Road
Ewing, New Jersey 08628-0718

and

the Contractor: _____ (the "Contractor")
_____
_____

in connection with

the Project: [Green Hall HVAC Upgrades] (the "Project")

The Architect: _____
_____
_____

ARTICLE 1
EMPLOYMENT OF THE CONTRACTOR/THE PROJECT DESCRIPTION

1.1 The College employs the Contractor and the Contractor agrees to perform the construction for the Project identified above. The Project is described in more detail in the College's Plans and Specifications prepared by the Architect.

ARTICLE 2
THE CONTRACT DOCUMENTS

2.1 The Contract Documents consist of this Contract for Construction and the Exhibits attached hereto ("Contract for Construction"), the General Conditions of the Contract for Construction (the "General Conditions") (and any other General, Supplementary and other Conditions), the Plans and Specifications, and also the following documents:

(a) The Contractor's Bid excluding limitations and qualifications unless such limitation or qualification is specifically accepted in writing by the College;
(c) Addenda and Clarifications issued before the bid due date;
(d) The Project Bidding Schedule; and
(e) Modifications issued after execution of this Contract for Construction.

These documents all form the "Contract," and are as fully a part of this Contract as if attached hereto or repeated herein. This Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral.

ARTICLE 3
SCOPE OF WORK

3.1 The Contractor shall fully perform the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. The Contractor shall assume full responsibility for constructing and completing the Project and all the Work, including providing all labor, Subcontractors, materials, equipment, and services reasonably inferable from the Contract Documents and all applicable laws, codes and professional standards, and providing all supervision, management, and scheduling required in the General Conditions and as noted throughout the Contract Documents.

ARTICLE 4
CONTRACT TIMES

4.1 TIME OF THE ESSENCE. All dates and durations specified in this Contract, including the Construction Start Date(s), any Milestones Dates, any Substantial Completion Date(s) and any Final Completion Date(s) (collectively, "Contract Times") are agreed to be of the essence.

4.2 CONSTRUCTION START. The Work shall start no later than ten (10) calendar days after the College issues a Notice to Proceed to the Contractor ("Construction Start Date"). If the Work is to be performed in phases, the College may issue a separate Notice to Proceed with respect to each phase (e.g., Phase 1 Notice to Proceed, Phase 2 Notice to Proceed, etc.) thereby establishing different Construction Start Dates for each phase (e.g., Phase 1 Construction Start Date, Phase 2 Construction Start Date, etc.). The College may, in its sole discretion and at no cost to the College, choose to delay the issuance of a Notice to Proceed and the Construction Start Date for any phase until after the Contractor has achieved Substantial or Final Completion of any other phase.

4.3 MILESTONES. The construction tasks or activities shall be completed within the number of calendar days after the Construction Start Date as set forth in the Notice to Proceed ("Milestone Dates"). If the Work is to be performed in phases, each phase may have

separate Milestone Dates (e.g., Phase 1 Milestone Dates, Phase 2 Milestone Dates, etc.), which dates shall be set forth in the Notice to Proceed for that phase.

4.4 SUBSTANTIAL COMPLETION. The Contractor shall diligently prosecute the Work and shall achieve Substantial Completion of the entire Work as set forth in the Notice to Proceed ("Substantial Completion Date"). If the Work is to be performed in phases, each phase may have a separate Substantial Completion Date (e.g., Phase 1 Substantial Completion Date, Phase 2 Substantial Completion Date, etc.), which date shall be set forth in the Notice to Proceed for that phase. The definition and requirements of Substantial Completion are set forth in the General Conditions. The Substantial Completion Date(s) shall only be changed by a written change order.

4.5 FINAL COMPLETION. The Contractor shall achieve Final Completion of the entire Work as set forth in the Notice to Proceed ("Final Completion Date"). If the Work is to be performed in phases, each phase may have a separate Final Completion Date (e.g., Phase 1 Final Completion Date, Phase 2 Final Completion Date, etc.), which date shall be set forth in the Notice to Proceed for that phase. The requirements for Final Completion are defined in the General Conditions as well as the Specifications of the Project. The Final Completion Date(s) shall only be changed by written change order.

4.6 LIQUIDATED DAMAGES FOR DELAY. If the Contractor fails to achieve Substantial Completion of a phase of the Work or of the entire Work by the Substantial Completion Date(s) set forth in the applicable Notice to Proceed (as extended by Change Order, if applicable), and the delay is not excused by the College, then the Contractor shall pay the College the following amounts as liquidated damages for delay ("Liquidated Damages") for each calendar day that the phase of the Work or the entire Work is not substantially completed beyond the applicable Substantial Completion Date:

$ 1/20th of 1% per calendar day.

The College and the Contractor agree that the actual loss to the College from construction delays and the inability to use the Project or any phase of the Project in a substantially completed state are for the most part difficult to quantify, and that the foregoing Liquidated Damages formula results in damages amounts that are a reasonable estimate of the damage to the College for not being able to use the Project in a substantially completed state and are not penalties and are not intended to be penalties. The College may deduct Liquidated Damages from payments due under this Contract, but its failure to withhold Liquidated Damages or to assert a claim for Liquidated Damages shall not be deemed a waiver of the College's right to withhold or to assert a claim for damages for any delay that occurs at any time on the Project.

ARTICLE 5
CONTRACT PRICE

5.1 CONTRACT PRICE. The Contractor shall be paid $_____ for the complete performance of this Contract, which was proposed by the Contractor in its bid and accepted by the College (the "Contract Price"). The Contractor shall be entitled to additional compensation for authorized changes which include the cost of the changes and mark-ups included in change orders approved in writing by the College in accordance with the change order provision set forth in the General Conditions.

5.2 ALTERNATES. The Contract Price is based upon and includes the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the College:

[_____]

5.3 UNIT PRICES. The Contract Price is based upon and includes the following unit prices, if any, which are described in the Contract Documents:

[_____]

5.4 ALLOWANCES. The Contract Price is based upon and includes the following allowances, if any, which are described in the Contract Documents:

[_____]

ARTICLE 6
PAYMENTS TO THE CONTRACTOR

6.1 PAYMENT. The Contractor will be paid by the College in accordance with this Article and the payment provision in the General Conditions.

6.2 MONTHLY PROGRESS PAYMENTS. The College will make progress payments as the Work proceeds based on written invoices submitted monthly by the Contractor and approved by the Architect and the College. No payments will be made until the Contractor submits a unit schedule break down showing the portions of the total Contract Price for each principal category of Work and value loaded CPM schedule allocating the Contract Price among the schedule activities. Monthly progress payment amounts shall be based on the percentages of the Work completed as of the end of the pay period (less earlier payments). All payment requests or invoices and all payments shall be governed by the payment provision of the General Conditions as well as any special requirements of this Contract, including the requirement that progress payments shall be based on a unit schedule breakdown and a value loaded CPM schedule.

6.3 RETAINAGE. The College will retain 2% of the amount due on each progress payment pending Final Completion of the Work. The holding and release of retainage shall be governed by the payment provision of the General Conditions.

6.4 CHANGE ORDERS. The Contractor shall invoice for change order work in the monthly progress payment invoices as the change order work is performed, but only after a written change order and TCNJ issued Purchase Order has been signed by the College. Changes in the Work shall be governed by the change order provision of the General Conditions.

6.5 FINAL PAYMENT. Upon final completion of all Work included in the Contract Documents including all change orders, acceptance of the Work by the Architect and the College, the satisfactory completion of all of the requirements in the General Conditions for final completion, and the issuance of the Certificate of Final Completion, the Contractor will be paid the fully adjusted Contract Price including any retainage withheld (less earlier payments). The invoice for final payment and final payment shall also be subject to the payment provision of the General Conditions and any special requirements of this Contract.

6.6 PAYMENT TERMS. All invoices and payments shall also be subject to the General Conditions, including the provisions regarding payments, to the right of the College to withhold payments or to make deductions from payments, and to the Prevailing Wage Act requirements set forth in the General Conditions. The College will pay proper final invoices within thirty (30) days of their submission to the College with the approval of the Architect.

6.7 SUBMISSION OF INVOICES. Prior to the submission of the invoice, the Contractor will submit to the College and the Architect, in draft form, a "pencil copy" of the monthly invoice for review and approval setting forth each line item for which the Contractor intends to request payment in that invoice based on the claimed percent completed for that line item. Upon receipt of said "pencil copy", the College and the Architect shall observe the Work in place and, on the basis of such observations, will either approve the amounts requested or modify the Contractor's request, based on the College's independent assessment of the Work in place. The College will then return the pencil copy invoice to the Contractor for the Contractor to then adjust and submit the final invoice with the agreed to percentages completed per line item to the College for payment. No invoice shall be submitted for payment until all amounts and completion percentages have been determined in this manner.

6.8 PROMPT PAYMENT ACT. For the purposes of the State's Prompt Payment Act, N.J.S.A. 2A:30A-1, et seq.:

(a) An invoice will be deemed to have been received when it is received by the College at the address designated in the pre-construction conference for receipt of the invoices.

(b) The "billing date" as that term is used in N.J.S.A. 2A:30A-2 shall be the earlier of the date upon which an invoice for payment is approved for payment or 20 days after the invoice is received, unless within such 20 day period the invoice is found to be incomplete or

otherwise unacceptable and returned to the Contractor, with a written explanation of deficiencies, the amount withheld and the reasons for withholding payment.

(c) In the event that an invoice is found to be deficient and returned to the Contractor, the "billing date" shall be calculated from the date that a corrected invoice is received.

(d) Payment shall be considered to have been made on the date on which a check for such payment is dated.

(e) Payment terms (e.g., "net 20") offered by the Contractor shall not govern the College's obligation to make payment.

(f) The following periods of time will not be included in the calculation of the due date of the Contractor's invoice:

(i) Any time elapsed between receipt of an improper invoice and its return to the Contractor, not to exceed 20 calendar days; or

(ii) Any time elapsed between the College's return of an improper invoice to the Contractor and the College's receipt of a corrected invoice.

If the State's Prompt Payment Act is amended, or the language stated herein is inconsistent with the language contained in the State's Prompt Payment Act, the language of the State's Prompt Payment Act shall control.

6.9 LIMITATIONS ON APPLICABILITY. The provisions of this Article shall not govern the College's payment obligations nor shall they supersede or modify any other contractual provision allowing the withholding of monies from the Contractor to the extent that the Contractor has not performed in accordance with the provisions of the Contract Documents. This Article also shall not govern the College's payment obligations nor supersede or modify any other contractual provision governing the Contractor claims for additional compensation beyond the base Contract Price and approved change orders.

6.10 INTEREST. Interest shall be payable on amounts due the Contractor if not paid within thirty (30) calendar days after the billing date specified above, as provided under the State's Prompt Payment Act, N.J.S.A. 2A:30A-1, et seq. Interest on amounts due shall be payable to the Contractor for the period beginning on the day after the required payment date and ending on the date on which the check for payment is drawn. Interest may be paid by separate payment to the Contractor, but shall be paid within 30 days of payment of the principal amount of the approved invoice. Nothing in this Article shall be construed as entitling the Contractor to payment of interest on any sum withheld by the College for any reason permitted under the Contract Documents or applicable law, or on any claim for additional compensation, over and above sums due under the base Contract Price or approved change orders.

ARTICLE 7
DISPUTE RESOLUTION

7.1 If a dispute or claim arises out of or relates to this Contract, or the breach thereof, and if the dispute cannot be settled through negotiation, the method for resolution of such dispute or claim shall be as provided in the dispute resolution provision of the General Conditions.

ARTICLE 8
TERMINATION OR SUSPENSION

8.1 This Contract may be terminated by the College as provided in the termination and suspension provision in the General Conditions.

8.2 The Work may be suspended by the College or the Contractor as provided in termination and suspension provision in the General Conditions.

ARTICLE 9
INSURANCE AND BONDS

9.1 CONTRACTOR'S INSURANCE. The Contractor shall purchase and maintain insurance as set forth in the insurance and bonds provision of the General Conditions. To the extent the Contractor shall be required to purchase and maintain additional insurance or insurance that differs from that set forth in the General Conditions, such requirements are set forth below:

[_____]

9.2 SUBCONTRACTOR'S INSURANCE. The Contractor shall ensure that its Subcontractors purchase and maintain insurance as set forth in the insurance and bond provision of the General Conditions.

9.3 PAYMENT AND PERFORMANCE BOND. The Contractor shall furnish the College with a payment bond and a performance bond as set forth in the insurance and bond provision of the General Conditions.

ARTICLE 10
OTHER PROVISIONS

10.1 CONTRACTOR REPRESENTATIONS. The Contractor represents to the College that it has:

(a) **Examination of the Contract Documents.** Examined and carefully studied the Contract Documents and the other documents in the bid documents, and that they are sufficient for performing the Work at the Contract Price.

(b) **Examination of Site.** Visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect the cost, progress, and performance of the Work.

(c) **Familiarity with Law.** Familiarized itself with all federal, state, and local laws and regulations that may affect the cost, progress, and performance of the Work.

(d) **Familiarity with Other Information and Other Documents.** Carefully studied all reports of investigations and tests of the site and subsurface conditions at or contiguous to the site and all drawings of physical conditions at the site including surface or subsurface composition, water, structures and utilities at or near to the site.

(e) **Additional Information Not Required for Bidding or Contract Performance.** Does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price.

10.2 ASSIGNMENT OF CONTRACT. The Contractor may not assign this Contract or any rights under or interests in this Contract including its right to payments under this Contract.

10.3 CONTRACTOR PERSONNEL ASSIGNED. The Contractor's team for this Project shall consist of the following personnel, who shall not be reassigned without the College's prior written consent:

Name	Position
_____	Project Executive
_____	Project Manager
_____	Project Superintendent
_____	Project Scheduler

The College reserves the right to request and have any member of the Contractor's or Subcontractor's staff replaced on the Project for any non-discriminatory reason.

10.4 NOTIFICATIONS/AUTHORIZED REPRESENTATIVE. All Notices required under this Contract shall be in writing, signed by the party giving same, and shall be deemed properly given only if hand delivered, sent by reputable overnight courier, or by registered or certified U.S. mail, return receipt requested, postage pre-paid and addressed as provided below.

Notice to the Contractor/Contractor's Representative. Written notices from the College and/or the Architect to the Contractor should be addressed to the Contractor's Representative:

_____
_____
_____
Attn: _____

Notice to the College/College's Representative: Written notices from the Contractor to the College should be addressed to the College's Representative:

The College of New Jersey
PO Box 7718,
Ewing, New Jersey 08628
Attn: _____

with a copy to the College's General Counsel as follows:

Thomas Mahoney, Esq.
Vice President and General Counsel
The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

The College's Contracting Officer hereby authorizes the College's Representative to receive all Contract related correspondence.

Notice to the Architect: Written notices from the Contractor to the Architect should be addressed to:

_____
_____
_____
Attn: _____

Neither the College's nor the Contractor's Authorized Representatives shall be changed without 7 days' written notice to the other party.

10.5 CONTRACT TERMS, CHANGES, AND LAW. This Contract constitutes the entire agreement between the College and the Contractor, and it shall be governed by the law of the State of New Jersey. The terms and conditions of this Contract may not be changed except by a writing signed by the Contractor and the College.

10.6 COUNTERPARTS AND SIGNATURES. This Contract may be executed in counterparts. All executed counterparts shall constitute one contract, and each counterpart shall be deemed an original. The parties hereby acknowledge and agree that facsimile signatures or signatures transmitted by electronic mail in so-called "pdf" format shall be legal and binding and shall have the same full force and effect as if an original of this Contract had been delivered. The College and the Contractor (1) intend to be bound by the signatures on any document sent by facsimile or electronic mail, (2) are aware that the other party will rely on such signatures, and (3) hereby waive any defenses to the enforcement of the terms of this Contract based on the foregoing forms of signature.

10.7 NO IMPLIED COVENANTS OR WARRANTIES. The Contractor acknowledges that there are no implied covenants or warranties from the College under this Contract.

10.8 SEVERABILITY. If any term or provision of the Contract Documents are to any extent held invalid or unenforceable, and if the provisions of the Contract Documents that are essential to each party's interests otherwise remain valid and enforceable, then (i) the remaining terms and provisions in the Contract Documents will not be affected thereby, (ii) each term and provision of the Contract Documents will be valid and enforceable to the fullest extent permitted by law, and (iii) the court/arbitrator(s) will give the offending provision the fullest meaning and effect permitted by law.

10.9 HEADINGS. The headings used in this Contract are for convenience and reference only, and are not part of this Contract, and do not in any way control, define, limit or add to the terms and conditions hereof.

10.10 INTERPRETATION/RULES OF CONSTRUCTION. The parties acknowledge that each party, and if it so chooses, its counsel, have reviewed and revised this Contract and that the normal rule of construction to the effect that any ambiguities be resolved in favor of the non-drafting party shall not be employed in the interpretation of this Contract or any amendments or exhibits thereto.

THE COLLEGE OF NEW JERSEY

By_____
William Rudeau,
Director of Construction

Date_____

By_____
Lloyd Ricketts,
Vice President and Treasurer

Date_____

By_____
Sharon Blanton,
Vice President for Operations

Date_____

By_____
Anup Kapur,
Executive Director of Procurement

Date_____

CONTRACTOR:

By_____

Title_____

Date_____

GENERAL CONDITIONS
OF THE
CONTRACT FOR CONSTRUCTION

Last Revised May 2021

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ARTICLE 1
CONTRACT DOCUMENTS, INTERPRETATION, INFORMATION FOR BIDDERS, CLAIMS BASED ON BID AND CONTRACT DOCUMENTS

1.1 Definitions.

Terms defined in the Contract for Construction shall have the meaning provided therein. Definitions for the purpose of these General Conditions include the following:

Addendum: A document issued to bidders by the College prior to the bid due date which supplements, revises or modifies the bid solicitation documents furnished for bidding purposes, and which must be identified and included in bids for the Contract.

Architect: The Architect (A/E) engaged by the College to design the Project, to prepare the design documents and assist with bid documents, and may administer the Contract and act as the agent of the College as described in the Contract.

Bulletin: A document prepared by the Architect describing proposed changes or additions to the Work in the Contract Documents that is issued after Contract award. If the College decides to implement the change, it will provide the bulletin to the Contractor and ask it to submit a change order proposal or request (in accordance with the change order provisions in the Contract for Construction, these General Conditions and other sections of the bidding documents).

Change Order Proposal or Change Order Request: A written proposal or request submitted by the Contractor in accordance with the change order provision of the Contract for Construction, these General Conditions and other sections of the bidding documents, including proposals submitted in response to Contract Change Directives, which proposes cost, time and other terms under which the Contractor will perform changed work under the Contract. If accepted by the College, a written change order signed by the Vice President for Administration and a TCNJ Purchase Order signed by the Contracting Officer of the College, and if accepted by the Contractor in writing, it will become part of the Contract as a change order.

The College's Representative: The College's Representative is a person or persons designated by the College to act on its behalf in administering the Contract for the College. The College's Representative may include the Director of Campus Construction, the Project Manager or an independent construction manager working for the Office of Campus Construction.

College Site Superintendent: The College Site Superintendent is a person or persons designated by the College to witness, observe, record and report on activities in and around the construction site. The Site Superintendent does not have the authority to stop or change the scope of the Work of the Contract Documents.

Contract: The Contract Documents all form the Contract. 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 (1) between the Contractor and the Architect or the Architect's consultants, (2) between the College and a Subcontractor or a Sub-subcontractor, (3) between the College and the Architect or the Architect's consultants or (4) between any persons or entities other than the College and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's Contractor's duties.

Contract Amendment: The Contract can only be amended by (1) a written amendment identified as such that is signed by the College and the Contractor, (2) a change order signed in accordance with the Contract Documents, (3) a written Contract Change Directive (CCD) issued by the College that should result in a change order unless issued to address some fault of the Contractor, (4) a written approval or acceptance by the College or the Architect of a change requested by the Contractor in writing, provided the request for a change is specifically identified in a submittal.

Contract Change Directive (CCD): A Contract Change Directive (CCD) is a written directive issued by the College which orders an addition, deletion, clarification of a disputed item or revision in the Work, or a response to an emergency. A CCD does not by itself change the Contract, but it should result in a change order which does change the Contract Price or Contract Times if warranted. A CCD should specify the terms of the change order (if deemed warranted by the College) which will result, and/or specify a deadline for the submission by the Contractor of a proper change order request, and/or contain other similar terms.

Contract Documents: The Contract Documents are enumerated in Article 2 of the Contract for Construction.

Contract Limit Lines: The lines shown on the Plans that limit the boundaries of the Project site, and beyond which no construction work or activities shall be performed by the Contractor unless otherwise specified in the Contract Documents, including the Plans and Specifications and supplemental General Conditions.

Contracting Officer: The Associate Treasurer of the College shall be the Contracting Officer in connection with the Contract and the Project. The Contracting Officer and other designee shall have authority to act on behalf of the College under the Contract.

Field Order (FO): A written order issued by the Architect or the College which requires minor changes in the Work that do not result in a change in the Contract Price or the Contract Times. If the Contractor believes that a field order warrants the issuance of a change order that changes the Contract Times or Contract Price, it must notify the College and the Architect in writing within 48 hours, and its notice must specify the terms of the change order that it believes are warranted, including specific time and price change requests.

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

Project: The Project is the total construction of the Work performed under the Contract Documents and may include construction by the College and by separate contractors that the College has specifically identified.

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

Supplemental General Conditions: The part of the Contract Documents which amends or supplements these General Conditions for the Project.

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

1.2 Intent Of Contract Documents.

The intent of the Contract Documents is to describe a functionally complete and aesthetically acceptable Project to be constructed and completed by the Contractor in every detail in accordance with the Contract Documents. Any Work, services, materials, equipment or documentation that may be reasonably inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce a complete Project shall be supplied by the Contractor whether or not specifically identified at no additional cost to the College. Where the Contract Documents describe portions of the Work in general terms but not in complete detail, only the best construction practices and only materials and workmanship of the first quality are to be used. Only where the Contract Documents specifically describe a portion of the Project as being performed by others is the Work to be considered to include less than the entire Project.

1.3 Interpretation Of Contract Documents.

When two or more interpretations of a Specification for the Work are possible, the most stringent or the highest cost interpretation shall apply as determined by the Architect. The Architect (or in the absence of the Architect, the College) shall be the sole interpreter of thePlans and Specifications and the Contractor's performance therewith. It is the intent of these Plans and Specifications to provide materials of a quality consistent with the highest standards provided under similar circumstances in the same general geographical area and that will resultin long-term use and efficient operation.

1.4 Law And Referenced Standards.

The Contractor is required to comply with all federal, state and local laws and regulations that apply to the Project, the Work and the Contract. Where the Contract Documents refer to any publication, including but not limited to any standard, which affects any portion of the Work or the Project, it shall be considered to mean the edition or revision in effect on the bid due date unless otherwise specified in the Contract Documents. No provision in any publication including

any standard shall create an obligation on the part of the College or the Architect to supervise or direct the Contractor's Work.

1.5 Plans And Specifications.

The Plans will include general plans and such details as deemed necessary to give a comprehensive representation of the construction required. The Contractor shall keep one set of Plans available at the Project site, which shall be available for inspection by the College and the Architect at all times. All alterations affecting the requirements in the Plans must be authorized by the College and the Architect in writing, and shall be promptly noted on the Contractor's record set of Plans, which are maintained at the site for inspection by the Contractor, the College and the Architect.

1.6 Order Of Precedence Of Contract Documents.

Each of the Contract Documents is an essential part of the Contract, and a requirement specified in one part of the documents is binding as if specified in all. The Contract Documents are intended to be complementary and to describe and provide for a complete Project. The obligations of the Contractor under the various Contract Documents shall be cumulative and to the extent that one of the Contract Documents imposes a stricter or more costly requirement or higher standard upon the Contractor than does another Contract Document, the more stringent or more costly requirement or higher standard, as determined by the Architect, shall apply. Otherwise, if there is any conflict among the Contract Documents, the signed Contract for Construction and all approved change orders shall control. As to the other Contract Documents, the order of precedence shall be as follows:

(a) Contract for Construction
(b) Addenda
(c) Supplemental General Conditions
(d) General Conditions
(e) Specifications
(f) Plans
    i. Notes
    ii. Large Scale Details
    iii. Sections
    iv. Elevations
(g) Scope of Work Description

1.7 Organization Of Plans And Specifications.

The arrangement of the Plans and the organization of the Specifications into divisions, sections or articles shall not be construed by the Contractor as being intended to divide or allocate the Work among Subcontractors or trades or to establish the scope of the Work to be performed by particular Subcontractors or trades. The College is not liable for the Contractor dividing and separating the Contract Documents into individual packages to Subcontractors. Items that the Contractor fails to include or provide for shall be at the Contractor's sole risk and

cost. The Contract Documents work together as a whole and, therefore, the Contractor is required to coordinate the entire package with all its Subcontractors.

1.8 Required Approvals.

In all cases where approvals or decisions under the Contract Documents are required from the College, the Work shall not proceed without the required approvals and decisions in writing.

1.9 Conformity Of Work To Contract Documents.

All Work performed shall conform to the lines, grades, cross-sections, dimensions, material requirements, tolerances, details and other information in the Contract Documents. The purpose of tolerances is to accommodate occasional minor variations from the middle portion of the tolerance range that are unavoidable despite reasonable construction practices. When a maximum or minimum tolerance value is specified, the material and the Work shall be controlled so that they shall not be preponderantly of borderline quality or dimension.

1.10 Work Involving Existing Structures.

On projects involving alterations, remodeling, repairs, installations or other work in pre-existing structures or systems, the Contractor shall by personal inspection of the existing structures and systems satisfy itself as to the accuracy of any information provided that may affect the quantity, size and/or quality of materials required for a satisfactorily completed Project, including information that is not identified or included in the Plans and Specifications. The Contractor shall provide all material and labor required to complete the Work based on conditions that can be reasonably observed by a competent and diligent contractor before bidding.

1.11 Verification Of Dimensions.

The Contractor shall verify all dimensions at the job site and shall take any and all measurements necessary to verify the information in the Plans. The Contractor shall properly and accurately layout and survey the Work. Any errors or discrepancies affecting the layout of the Work shall be reported to the Architect and the College immediately in writing. No Work affected by any error or discrepancy shall proceed until such discrepancy is resolved by a writtendecision of the Architect with the consent of the College.

1.12 Manufacturer Literature.

Manufactured articles, materials and equipment shall be installed, applied, connected, erected, used, cleaned and conditioned in accordance with the manufacturer's written instructions unless otherwise specified in the Contract Documents. If there is any conflict between manufacturer literature and the Contract Documents, it shall be reported by the Contractor to the Architect and the College in writing, and the Contractor shall not proceed without a written decision by the Architect with the consent of the College.

1.13 Quality -- General Requirement.

Where no explicit quality or standard are specified for Work, materials or equipment, they shall be new, of good quality, free of defects, suitable for their intended use, in conformity with the Contract Documents, and consistent with the highest quality of the surrounding Work and of the construction of the Project generally.

1.14 Examination Of Contract Documents Before Bidding/Errors.

The Contractor represents and warrants that before bidding it examined and carefully studied the Contract Documents and other documents included or referred to in the bid documents. The Contractor also represents and warrants that the documents are sufficient for bidding and performing the Work at the Contract Price. Should it appear that any of the Work ormaterials are not sufficiently or properly detailed or explained in the Contract Documents, the Contractor shall notify the College in writing before the bid deadline for submitting questions.

Errors, omissions, conflicts, discrepancies, inconsistencies or other defects in the Contract Documents or between the Contract Documents and any codes, standards or other applicable documents which are capable of being discovered by a diligent and competent contractor before bidding shall be reported to the College in writing before the bid deadline for submitting questions. If errors, omissions, inconsistencies or other defects in the ContractDocuments are not discovered until after the bid due date, the Contractor shall promptly notify the College and the Architect of them in writing, provide written recommendations regarding changes or corrections to resolve any such errors, omissions, inconsistencies or defects, and obtain the Architect's written interpretation and approval with the consent of the College before proceeding with the Work affected.

1.15 Site Information.

Soil borings, test pits or other subsurface or site information regarding the physical site and subsurface conditions on or near the site may have been obtained from independent contractors for the purpose of preparing the design documents for the Project rather than for the purpose of contractor estimating or bidding. Such information may be identified or included in the Contract Documents so that it can be reviewed by bidders during the bidding phase, but because of the limited nature and purpose of the information, it shall not be considered to be part of the Contract Documents, and the Contractor must assume responsibility for interpreting and relying upon the information.

1.16 Sufficiency Of Documents Provided For Bidding.

The Contractor represents and warrants that before bidding it carefully studied all reports, surveys and documents included or identified in the bid documents regarding observations, inspections, investigations and tests of the site and subsurface conditions at or near the site, and all information provided to bidders regarding physical conditions at or near the site, including surface and subsurface composition, water, structures and utilities, and that it determined that no further examinations, investigations, tests, studies or data were necessary for bidding or the performance of the Work at the Contract Price. If the Contractor concluded that additional

information is required, it must notify the College in writing before the bid deadline for submitting questions.

1.17 Examination Of Site Before Bidding.

The Contractor represents and warrants that before bidding it visited the site and familiarized itself with and was satisfied as to the general, local and site conditions which may affect the cost, progress and performance of the Work and the Contract, and that its bid and bid price take into account all such conditions. No additional costs will be borne by the College for conditions that existed and were reasonably observable or described at the time of bidding.

1.18 Hazardous Materials On Site.

The Contractor will not be responsible for hazardous environmental conditions uncovered or discovered on the site that were not disclosed in the Contract Documents and that were not caused by the Contractor or anyone working through or under the Contractor. If such conditions are discovered, the Contractor shall stop work and notify the College in writing immediately. The College may issue a written directive to the Contractor requiring it to stop work until the hazardous environmental condition is remedied, and the Contractor will be entitled to an extension of the Contract Times if an extension is warranted under the provisions of the Contract for Construction and these General Conditions regarding extensions. The College may also make changes in the Contract in response to the conditions, and the Contract will be changed in accordance with the change order provisions in the Contract for Construction and these General Conditions.

1.19 Limitation On Claims Based On Contract Documents And Information Provided For Bidding.

The Contractor may not assert claims for extra compensation beyond the bid and Contract Price for constructing the completed Project by reason of any errors, omissions, inconsistencies, or defects in the Contract Documents that are discoverable by a diligent and competent contractor, because of (i) its obligation to review and study the bid documents before submitting its bid, (ii) its representation in the Contract Documents that it did so, and (iii) its obligation to notify the College in writing of any such errors, omissions, inconsistencies, or defects before submitting its bid,. In addition, the Contractor may not assert claims for extra compensation beyond the bid and Contract Price for constructing the completed Project by reason of any lack of information affecting the construction of the Project at the time of bidding, or errors in the information included or referenced in the bid documents except to the extent explicitly permitted by the Contract for Construction or these General Conditions. The Contractor shall notify the College in writing before submitting its bid of any errors or omissionsin the information provided or be precluded from seeking extra compensation or asserting a claim. This limitation on claims may be modified and further restricted in the signed Contract for Construction when the Contract Documents explicitly require the Contractor to participate in any aspect of the design phase.

The Contractor may assert claims for extensions and additional compensation in accordance with the provisions of the Contract for Construction and these General Conditions if

information regarding the site that is identified in the bid or Contract Documents is factually inaccurate, and the inaccuracy is one that a reasonably competent and diligent contractor would not discover in preparing a bid. The Contractor may not assert a claim for an extension or extra compensation when it claims, not that the information is factually inaccurate, but rather that conclusions, inferences or judgments made in reliance on accurate information prove to be incorrect.

ARTICLE 2
THE COLLEGE

2.1 General Rights And Responsibilities Of The College.

The College as the owner of the Project is entitled to have the Contractor perform and complete the Work in accordance with the Contract Documents, including the time of completion, quality and documentation requirements of the Contract. The College for its part undertakes to furnish the site, to notify the Contractor of any restrictions on the site that could affect the Contractor's performance of the Contract, to obtain approvals relating to the site that are needed for the construction to proceed, to pay the Contractor in accordance with the Contract, and to act reasonably in reviewing all documentation, claims and questions properly submitted to it under the Contract. The College also undertakes to provide the information and items that it expressly agrees in the Contract Documents to provide.

The College shall also have such other rights and responsibilities as are specified in the Contract Documents. The College will not supervise the Contractor's Work or be responsible for the Contractor's construction means and methods, or the Contractor's safety practices, or any failure of the Contractor to comply with the Contract Documents or any laws or regulations.

2.2 The College's Representative, Authority To Decide Contract Questions.

The Contracting Officer delegates its authority to the College's Representative who is authorized to act and make decisions on behalf of the College regarding matters specified in the Contract Documents. However, the College's Representative is not authorized to make or agree to material changes to the Contract Documents or changes involving the Contract Times or Contract Price.

All changes to the Contract Documents including change orders that modify Contract Price, Contract Times or other material change to the Contract Documents must be reviewed and approved by the Contracting Officer or his/her designee. The Contracting Officer designates that the Vice President for Administration is authorized to approve change orders.

The College's Representative, in consultation with the Architect, is authorized to decide on behalf of the College, all questions regarding the quality, acceptability and rate of progress of the Work, all questions regarding the interpretation of the Contract Documents, the acceptability of the performance of the Contract by the Contractor, and the compensation due to the Contractor. Where the College's Representative is authorized to render decisions under the

Contract for Construction or these General Conditions regarding disputes or claims, he/she shall consult with the Architect and shall not act arbitrarily so as to unfairly benefit either the College or the Contractor.

2.3 Required Approvals.

In all cases where approvals or decisions are required from the College under the Contract Documents, such approvals or decisions shall be made reasonably, except in cases where a specific standard applies such as, for example, situations where the College is entitled to exercise unqualified discretion in selecting the types of materials, products or construction whichit decides to procure.

2.4 Information Required From The College.

Information which the Contract Documents specify the College will provide shall be provided with reasonable promptness.

2.5 Permits.

The College will arrange and pay for permits and permit inspections, including building code permits except to the extent that the Specifications specify otherwise. The Contractor will arrange for and coordinate all inspections and the dates and times for all inspections with local, state and independent agencies and include the College's Representative or the SiteSuperintendent.

2.6 The College's Inspection Of The Project.

The College shall have the right to be represented at the site by the College's Representative(s), the Site Superintendent and other College employees designated by the College, the Architect, and other consultants designated by the College or the Architect. The College and its representatives shall have the right to visit the site, inspect Work and materials, inspect Project documentation, conduct tests, attend meetings, meet with the Contractor' and the Subcontractors' representatives, investigate problems, conduct studies, and make reports. The College and its representatives shall be allowed access to all parts of the Work, and the Contractor shall furnish them with information and assistance when they request it.

The Contractor shall give the College and the Architect timely notice of readiness of Work for observation, inspection and testing, and shall cooperate with these efforts. TheContractor shall also comply with any inspection and testing procedures specified in the ContractDocuments.

The Contracting Officer, the Architect and the College's Representative shall have the right to direct the Contractor to remove or uncover unfinished Work if deemed necessary to inspect Work or materials in place.

If Work is covered before it is inspected because the College, the Architect or any consultant were not afforded reasonable notice and an opportunity to inspect, or where the

Contract Documents or any law require an inspection, the Contractor shall uncover and replace Work at its own expense if required to do so by the College.

If any other portion of the Work not specifically required to be inspected is covered, and the College or the Architect did not ask to observe or inspect the Work before it was covered, the College may nonetheless ask to inspect the Work. If the College makes such a request, the Contractor shall uncover the Work for inspection. If the Work uncovered is found to be in accordance with the Contract Documents, the cost of uncovering and replacement shall be paid by the College by a change order. If the Work uncovered is found not be to in compliance with the Contract Documents, the Contractor shall pay all costs of uncovering and replacement, and also remedy the defect or deficiency at its own cost.

The College at all times retains the right to stop all or part of the Work by a written direction because of defective Work until the defect is eliminated. This right shall not give rise to any duty on the part of the College to exercise the right for the benefit of the Contractor or those performing its Contract.

The College at all times retains the right to stop all or part of the Work due to concerns with the effectiveness of the Contractor's safety program required under Article 5.2. The College may require the Contractor to provide a written plan to correct safety deficiencies, an on-site safety supervisor, or other administrative or engineering controls to ensure the safety of personnel impacted or potentially impacted by Contractor operations. The Contractor shall indemnify, defend and hold the College harmless from fines issued by Federal, State or Local OSHA enforcement.

2.7 The College's Inspectors, Duties And Limitations

If the College designates inspectors to inspect Work and materials and Project documentation, they will not be authorized to alter or waive any requirements or provisions in the Contract Documents. The College's inspectors will not be authorized to issue instructions contrary to the Contract Documents or to act as foremen or employees of the Contractor. The College's inspectors have the authority to reject unsuitable Work or materials, subject to written confirmation by the College's Representative. If the Contractor believes that any action of a College inspector is contrary to the Contract Documents, it shall notify the College's Representative and the Architect in writing within 48 hours. The College does not undertake to have inspectors sufficient in number to inspect every item of Work or material as it is provided, or to have inspectors with the expertise needed to judge every aspect of the Work.

The Contractor shall remain responsible for defective Work or materials irrespective of any inspections or lack of inspections during the Work. If the Contractor seeks a binding determination of the acceptability of Work or materials during the performance of the Contract,it shall do so by making a written request for such a determination to the College's Representative with a copy to the Architect.

2.8 The College's Rejection Of Defective Work.

The College shall have the right to reject defective Work, materials, or equipment at any time, and to require the Contractor to remove and replace it at the Contractor's expense. The Contractor shall also be responsible for repairing damage to other work caused by defects or deficiencies in its Work. The College's Representative, upon consultation with the Architect, may elect to accept Work or materials that do not conform to the Contract Documents and to credit or reduce the Contract Price, but the College shall have no contractual obligation to elect this remedy. Changes to the Contract Documents in these circumstances shall be recorded as a change order under the change order provision of the Contract for Construction and theseGeneral Conditions.

ARTICLE 3
THE ARCHITECT

3.1 The Architect's General Role.

The Architect is, by contract with the College, responsible for the design of the Project. During construction, the Architect is responsible for reviewing the Contractor's submittals to determine if they conform to the Contract Documents and good industry practice, to provide some level of inspection to determine if Work and materials provided by the Contractor conform to the Contract Documents and good industry practice, and to review the Contractor's payment applications. During the performance of the Work, the Architect may investigate any defects and deficiencies in the Work or materials provided and make recommendations to the College regarding the defects or deficiencies. The Architect will conduct inspections to determine if the Contractor has achieved proper Substantial and Final Completion and submitted all documents required at Substantial and Final Completion. The Contractor shall cooperate with and render assistance to the Architect in the performance of these duties.

3.2 The Architect's Access And Facilities.

The Contractor shall allow the Architect and its consultants access to the Project at all times and shall facilitate their access to inspect Work and materials and Project documentation. The Architect and its consultants shall be permitted to attend job meetings, scheduling meetings and other meetings at the site and the Contractor shall facilitate their ability to do so. The Contractor shall provide an office at the site for the Architect if the Specifications require it to doso.

3.3 Limitation Of The Architect's Responsibilities.

The Architect will not be responsible for or have control of construction means and methods or safety precautions and programs in connection with the Work. The Architect will not be responsible for or have control of acts or omissions of the Contractor, its Subcontractors, or any of their agents or employees, or any other person performing any of the Contract Work.

3.4 The Architect's Rejection Of Work.

The Architect may recommend rejection of Work or materials that it believes does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, it may recommend to the College special inspections or testing of Work or materials, including completed Work and materials.

3.5 The Architect's Review Of The Contractor's Submittals.

The Architect will review, approve or take other appropriate action regarding the Contractor's submittals, such as shop drawings, product data and samples, to assure that they conform with the design requirements and Contract Documents. The approval of a specific item shall not be deemed to constitute approval of an assembly of which the item is a component.

3.6 The Architect's Review Of The Contractor's As-Built Plans.

The Architect will periodically review the Contractor's as-built plans maintained at the site to ensure that they are up-to-date, and shall review the completed as-built plans at Project completion to ensure that they are complete and are provided to the College.

3.7 The Architect's Determination Of Substantial and Final Completion.

The Architect will conduct inspections to determine the dates of Substantial and Final Completion and to determine if the Contractor has properly Substantially and Finally completed the Project. The Architect will obtain from the Contractor all written warranties and all other documents that the Contractor is required to provide at Substantial and Final Completion of the Project.

ARTICLE 4
THE CONTRACTOR

4.1 The Contractor's Responsibility For Performance Of The Contract And Work.

The Contractor is the person or entity identified as such in the Contract. The Contractor shall be lawfully licensed in the jurisdiction where the Project is located.

The Contractor shall perform all of the duties in the Contract Documents, shall furnish the labor, materials and equipment to complete the construction of the Project in accordance with the Contract Documents, and furnish all services, labor, materials and equipment necessary or appropriate to construct the Project. The Contractor shall manage, supervise, schedule, direct, and inspect the Work as competently, skillfully, and efficiently as possible, and shall be solely responsible for all construction means, methods, techniques, safety, security, sequences, procedures, and coordination.

The Contractor shall comply with all applicable laws, and shall establish and maintain reasonable quality assurance and safety programs in connection with its Work. The Contractor shall complete the Work in compliance with the Contract Documents and by Milestone, Substantial Completion and Final Completion Dates in the Contract for Construction or any authorized extensions thereof. The Contractor shall maintain good order and discipline at the site at all times.

4.2 The Contractor's Key Personnel.

The Contractor shall assign to the Project a Project executive, Project manager, superintendent, and scheduler, and such other key personnel as are specified in the Contract for Construction or as required to carry out the requirements of the Project. The Contractor shall not remove or replace such key personnel without the College's written approval. The College has the authority to reject and have replaced any staff member of the Contractor or any of the Subcontractors for any non-discriminatory reason.

4.3 The Contractor's Supervision Of Contract Work/The Superintendent.

The Contractor shall supervise and be responsible for the acts and omissions of the Contractor's employees, agents, Subcontractors, sub-subcontractors, suppliers and other persons performing portions of the Work and the Contract. The Contractor's designated Project superintendent shall be at the Project site at all times when Work is in progress. The Contractor may designate in writing an alternate superintendent who must be approved in writing by the College. The superintendent (or alternate) shall have full authority to represent and act for the Contractor at the site and shall have full authority to execute orders and directives of the College without delay.

Communications from the College or the Architect to the superintendent shall be deemed to have been given to the Contractor. The superintendent shall be capable of and authorized to respond to all hazardous and unsafe conditions at the Project site and to implement prompt corrective measures to eliminate all unsanitary, hazardous or dangerous conditions at the site. The College may suspend all or part of the Work at the Project site if the superintendent (or alternate) is not present at the Project site. Such a suspension shall not be the basis of a claim against the College, including without limitation any claim for additional time or extra cost.

The superintendent shall attend all meetings at the Project site including job meetings, scheduling meetings, and meetings with the College and/or the Architect. The superintendent shall have a written plan that must be approved in writing by the College for responding to emergencies when the Work is not in progress. The Contractor shall also utilize qualified competent craftsmen on the Project.

4.4 Cooperation With The College And Other Contractors.

The College reserves the right to contract for and perform other or additional work on or adjacent to the Project site. When separate contracts are let within the limits of the Project site, or in areas adjacent to the site, the Contractor shall perform its Work so as not to interfere with or

hinder the progress or completion of the work being performed by other contractors. The Contractor shall also affirmatively cooperate with such other contractors and coordinate its activities with theirs, and include coordination measures in the Project Schedule. The Contractor shall arrange its Work and shall place and dispose of materials being used so as not to interfere with the operation of other contractors within the limits of the Project site. The Contractor shall join its Work with that of the other contractors in an acceptable manner and shall perform its Work in proper sequence with that of other contractors.

If there is a disagreement as to the respective rights of the Contractor and others doing work within the limits of or adjacent to the Project site, the College shall determine the respective rights of the contractors involved to secure the satisfactory completion of all affected work. The Contractor shall not be entitled to additional compensation beyond its Contract Price that may arise because of inconvenience, delay, or loss experienced by it as a result of the presence and operations of other contractors working within the limits of or adjacent to the Project site.

The College reserves the right to occupy any portion of the Project that is ready for occupancy prior to Final Completion and acceptance of the Project, after Local and State Construction Enforcing Agency approval.

The occupancy of any portion of the Project does not constitute an acceptance of any Work nor does it waive the College's right to liquidated damages or constitute an acceptance of any Work, as the Project will be accepted as a whole and not in units. Prior to such occupancy, however, the Architect, a representative of the College, and the Contractor shall fully inspect the portions of the Project to be occupied, preparing a complete list of omissions of materials, faulty workmanship, or any items to be repaired, torn out or replaced. The College will assume responsibility for damage to premises so occupied of any items not on this list when such damage is due to greater than normal wear and tear, but does not assume responsibility for improper or defective workmanship or materials.

4.5 Performance Of The College Directives.

When the College issues a written directive to the Contractor under the authority of any provision in the Contract for Construction or these General Conditions, the Contractor shall perform as directed in a diligent manner and without delay. Compliance with written directives shall not adversely affect the rights of the Contractor under the Contract for Construction, these General Conditions or law, but if the Contractor objects to a directive of the College, or claims that a directive infringes upon its rights or entitles it to a change order, it shall notify the College in writing within 2 business days of any directive and describe any objection it has to the directive and the reasons for its objection. Objection to a written directive does not relieve the Contractor of the obligation to comply with the directive and proceed in a diligent manner to implement the directive without delay.

ARTICLE 5
PERFORMANCE OF WORK

5.1 Protection Of Work/Materials.

The Contractor, shall at its own expense, protect all finished Work and materials from damage and keep them protected until the Project is accepted as Substantially Completed, and shall repair or replace any Work or material damaged before acceptance. After the Project is accepted as Substantially Complete, the Contractor will remain responsible up through Final Completion for damage to Work and materials caused by it or its Subcontractors or others participating in the performance of its obligations under the Contract Documents. The Contractor shall also secure and protect its own tools, equipment, materials and supplies, and the College shall have no liability for damage, theft or injury to the Contractor's property.

5.2 Safety And Safety Programs.

The Contractor shall have full responsibility for safety at the Project site at all times up to Final Completion and acceptance of the Project and the Contract. The Contractor shall provide for the safety of all individuals on the Project site, and take measures to ensure that individualson or near the Project site are not injured by the performance of the Contract. The Contractor shall establish and maintain a Project safety program in accordance with all applicable laws including OSHA, good industry practice, and any additional requirements in the Contract Documents. If the College or the Architect become aware of an unsafe situation, the Contractor will immediately respond to remedy the safety concern and shall take all other actions necessary to comply with Article 2.6.

5.3 Emergencies Affecting Safety.

If there is an emergency affecting the safety of persons or property, the Contractor shall take immediate action to prevent damage, injury or loss. The Contractor shall notify the College in writing of the situation and all actions being taken immediately or as soon as possible. If, in the opinion of the Contractor, immediate action is not required, the Contractor shall notify the College in writing of the emergency situation and proceed in accordance with the College's instructions. However, if loss, damage, injury or death occurs that could have been prevented bythe Contractor's prompt and immediate action, the Contractor shall be liable for all costs,damages, claims, actions, suits, attorney's fees and other expenses that result.

Any additional compensation or extension of time claims by the Contractor on account of emergency Work shall be determined in accordance with the change provisions of the Contract for Construction and these General Conditions. The Contractor shall be responsible for emergencies and costs and delays resulting therefrom that could have been foreseen or preventedwith normal diligence, planning, and supervision of the Work, or that are caused by the Contractor's failure to properly perform the Contract.

The Contractor shall provide the College with a list of the names and telephone numbers of its employees and employees of each Subcontractor designated to be contacted in case of an emergency during non-working hours. A copy of this list shall be displayed prominently at the

Project site so that it is visible when the Project site is secured and shall be provided to the College's campus police department.

5.4 Working Hours.

Except as required for the safety or protection of persons or property, or as specified in the Contract Documents, all Work at the site shall be performed during regular working hours, and not on Saturdays, Sundays, legal holidays, the College's commencement days, resident move-in and move-out days or other days specifically noted in the Contract Documents without the prior written consent of the College, which will not be unreasonably withheld.

5.5 Site Security.

The Contractor shall provide, maintain and oversee security at the site if required in the Specifications. The Project site shall be fenced as specified in the Specifications, and the Contractor shall control access when gates are unlocked or open. The fence shall provide a physical barrier to the site and protection from visible nuisance. At a minimum, the fence shall be firmly secured with buried posts or weighted feet, top rails, metal fabric, and locking gates. Contractor shall immediately notify the College in the event of unauthorized entry to the site.

5.6 Site Use.

The Contractor shall confine construction equipment, storage and Work to the Project site absent written approval from the College. Any request by the Contractor to use areas outside the Project site must be described in written form and included with the Contractor's bid.

5.7 Building Access.

The Contractor shall be responsible for the sign out, distribution, safe use and return of all building keys and/or access cards, and shall be responsible for all costs associated with failureto return these items (e.g., the cost to re-key/re-implement the system).

5.8 Minimize Interruption.

The Contractor acknowledges that the College is an existing educational facility and that classes may be in session during construction. The Contractor agrees to conduct its Work with as little disruption as reasonably possible to the College's students, faculty, employees and guests, and will maintain a safe environment for the College's students, faculty, employees and guests, in addition to the Contractor's employees and workers of all tiers. The Contractor and its Subcontractors and employees of all tiers must display courtesy and consideration with and shall refrain from discriminating against or harassing the College's students, faculty, employees, visitors and guests at all times. The Contractor will not allow smoking, vaping, alcohol, drugs, any firearms, or other weapons on the College's property at any time. The Contractor shall abide by all campus traffic regulations.

5.9 Submittals (Shop Drawings, Product Data, Samples).

Prior to the beginning of Work on the Project, the Contractor shall furnish to the Architect and the College for their review and approval, a schedule setting forth all the submittals, including shop drawings, product data and samples required by the Contract Documents, that the Contractor intends to submit to the Architect for review and approval, the date upon which the Contractor shall make each such submittal and the date upon which the Architect shall complete its review of each such submittal, which in no event shall be less than ten (10) days from receipt ("Submittal Schedule"). The Architect and the College shall identify all submittals that will require more than ten (10) days to review and notify the Contractor of the required review period. The Contractor shall adjust the Submittal Schedule to accommodate the extended review period. The Architect shall endeavor to conduct its review and approval of all submittals in accordance with the Submittal Schedule. In the event that a submittal is made that is not set forth on the Submittal Schedule, the Architect shall review and return such submittal within ten (10) working days from receipt.

Submittals shall be complete as to quantities, details, dimensions and design criteria. The Architect will approve and the College will review submittals if they conform to the Contract Documents, the design concept and good industry practice. The Contractor shall note itsapproval of all submittals and the date for any submittals prepared by any Subcontractor or supplier, and it shall be responsible for determining and verifying all materials, field dimensions,field construction criteria, and coordination requirements pertaining to the submittal.

The Contractor will not be relieved of responsibility of deviations in submittals from the requirements in the Contract Documents by reason of approvals of the submittals unless the Contractor specifically identifies the deviation in the submittal and the Architect and the College expressly approve the deviation in writing. The Contractor shall be responsible for errors or omission in its submittals. No Work or materials included in a submittal shall begin until the submittal is approved by the Architect and the College.

5.10 Layout And Dimensional Control.

The Contractor shall be responsible for locating and laying out the Project components and all of the Project parts on the Project site in strict accordance with the Plans, and shall accurately establish and maintain dimensional control. The Contractor shall employ a competentand licensed New Jersey engineer or land surveyor as appropriate to perform all layout Work andto fix the level and location of excavations, footing base plates, columns, walls, floors and roof lines. The Contractor shall furnish to the College and the Architect certifications that each such level is as required by the Plans as the Work progresses.

The plumb lines of vertical surfaces shall be tested and certified by the Contractor's engineer or surveyor as the Work proceeds. The engineer or surveyor shall establish all points, lines, elevations, grades and bench marks for the proper control and execution of the Work. The engineer or surveyor shall establish a single permanent benchmark to be approved by theArchitect, to which all three coordinates of dimensional control can and shall be based. The engineer or surveyor shall verify all topographical and utility survey data, and all points, lines, elevations, grades and benchmarks furnished by the College.

Should any discrepancies be found between information in the Plans and the actual site or field conditions, the Contractor shall notify the Architect and the College in writing, and shall not proceed with any Work affected until it receives written instructions from the College.

The Contractor is required to provide a final "as built" survey from a New Jersey licensed/certified surveyor of the Project site showing all structures, elevations, grades and required information on the Project site and submit to the College in CADD format.

5.11 Construction Access, Roads, Walks, And Parking.

The Contractor shall construct and keep all roadways, drives, walkways and parking areas within or near the site free and clear of debris, gravel, mud or any other site materials, including, for example, the cleaning of muddy wheels and undercarriages on vehicles before they exit the site. The Contractor shall be responsible for any citations, fines, or penalties imposed onit or the College for failing to comply with applicable local rules or laws regarding its use of roads and the like.

The Contractor shall obtain permission in writing from the College before using for construction purposes any existing driveways, parking areas, walkways or areas not specifically designated for such use in the Contract Documents. The Contractor shall maintain such driveways and areas in good and clean condition during construction and not damage them. At Final Completion, the Contractor shall leave them in the same condition as they were at the start of the Work. Conditions of such facilities before use shall be photographed and otherwise documented by the Contractor. The Contractor shall not commence construction of permanent driveways, parking areas or walks on the Project site without the written approval of the College.

Any existing walkways, driveways, aprons, or curbs damaged by the Work of the Contract Documents shall be replaced in kind, at the Contractor's expense, immediately upon Project completion, or as required to maintain campus safety and campus aesthetics.

5.12 Construction Site Condition, Storage, Dust Control.

The Contractor shall provide reasonable, safe and orderly storage for its equipment, tools and materials, and shall not unreasonably encumber the site. The Contractor shall keep the site and the Project free from the accumulation of refuse, debris and scrap materials caused by its operations so that the site has a neat, orderly and workman-like appearance. Loading, cartage, hauling and dumping will be at the Contractor's expense. The Contractor shall provide, at its expense, temporary dust-proof partitions around areas of work in existing buildings, and where reasonably required, in new building areas.

5.13 Photographs.

The Contractor shall provide, at its expense, monthly progress photographs of the Project. The photographs shall be 8 inches by 10 inches and shall be submitted to the College in duplicate monthly. Unless otherwise specified in the supplemental general requirements, four photographs

shall be submitted each month which provide views of the Project taken from the same four points each, which points shall be selected by the Architect.

5.14 Project Sign.

The Contractor shall, at its expense, provide, erect and maintain two Project signs at the site, which shall be described in the Contract Documents. The College will specify the location of the signs. The signs shall be painted by a professional sign painter or prepared by aprofessional graphic artist. No other signage will be permitted at the site. The signs shall include the name and cell phone number of a Contractor-designated project lead that is available for 24-hour contact in case of emergency. The Contractor shall remove the signs when the Project is finally accepted unless the College requests that they be removed earlier.

5.15 Soil Conservation.

The Contractor shall employ reasonable measures to conserve the soil at the site, and determine and comply with all soil conservation measures required by the Mercer County Soil Conservation District.

The Contractor shall coordinate and schedule all soil conservation inspections, shall provide the College with written notice of all such inspections so that the College may attend the inspections if it chooses in its sole discretion to do so, and shall provide the College with all site inspection notes, approvals or notices.

5.16 Temporary Facilities, Services, Electric, Heat And Enclosures.

The Contractor shall provide storage areas, temporary drives and sidewalks, employee parking areas, staging areas, excavation borrow/spoil areas, commercial canteen areas, field offices including a meeting room, telephones, toilet facilities, and other temporary facilities that are necessary to perform the Work or that may be required by the Project Specifications. The Contractor shall locate these facilities on the Project site, and the location shall be subject to the approval of the College.

The Contractor shall provide adequate and clean temporary toilet facilities on the Project site in locations to be approved by the College, and they shall be serviced at least twice a week by a firm qualified and experienced in such functions. The Contractor shall provide such temporary electricity, water, and other utilities that are necessary to perform the Work, or that may be required by the Project Specifications. The Contractor shall also supply such temporary enclosures and heat that are necessary to perform the Work or that may be required by theProject Specifications. The Contractor and the Subcontractors will not enter or use any College facilities not required by the Work of the Contract.

Temporary electric and heat shall be furnished by the Contractor for the benefit of other contractors working on the Project if specified in the Project Specifications.

The Contractor shall not anticipate using the permanent heating or air conditioningsystem in a building for temporary heat or air conditioning prior to the acceptance of the Project as Substantially Complete unless specified otherwise.

Any natural gas, combustible material, or hazardous material containers utilized by the Contractor must be stored in a safe, ventilated location approved by the College. The Contractor must also submit for approval a reasonable safety plan for the operation of temporary heat equipment. The Contractor shall be solely responsible for any natural gas, combustible material or hazardous materials containers utilized by the Contractor or any of its Subcontractors andshall indemnify, defend and hold harmless the College from any fines, costs, expenses, liabilities, damages, etc. resulting from the Contractor's or any of its Subcontractors' use of such materials.

5.17 Substitutions.

To the extent that the Contractor includes in its bid substitute materials or equipment or construction methods in lieu of those specified in the Contract Documents, it does so at its own risk. Any substitution must be equal in type, function and quality to the item required in the Contract. The Contractor must submit all information required within 20 days of the Contract award to determine if the proposed substitute is equal to the requirements of the Contract Documents, and any substitution must be approved in writing by the Architect and the College.

The College shall have complete discretion to decide whether it will accept any substitution. No substitution shall result in any increase in the Contract Price or Contract Times. The Contractor in its application for the substitution must certify in writing that the substitution is equal to what is specified in the Contract Documents in all material respects and will not increase the Contract Times or Contract Price of the Work.

Should the substitution be rejected, the Contractor will then be required to provide the specified product, material or method at no additional cost to the College and no change in the Project Schedule.

5.18 License Fees.

The Contractor shall be responsible for obtaining the right to use any equipment, design, device or material required to perform the Contract, and shall include in its Contract Price any license fee or royalty required.

ARTICLE 6
SUBCONTRACTORS

6.1 The Contractor's Responsibility For Subcontracted Work.

The Contractor shall be fully responsible to the College for the proper performance of the Contract irrespective of whether the Work is performed by the Contractor's own forces or by Subcontractors employed by the Contractor. The Contractor shall be responsible for the acts and

omissions of its Subcontractors and suppliers on the Project and shall take appropriate measures if they are not properly supervising or performing their Work.

6.2 Subcontractor Identification And Approval.

The Contractor shall have included with its bid for the Contract, the names, addresses and license numbers of all Subcontractors that it proposes to utilize on the Project for plumbing and gas fitting work, HVAC work, electrical work, structural steel and ornamental iron work. No Subcontractor may perform Work on the Project until it has been approved in writing by the College.

Within 20 days after issuance of the Notice to Proceed, the Contractor shall furnish to the Architect and the College in writing for review by the Architect and the College a list of the names of all Subcontractors, sub-subcontractors, fabricators, manufacturers, sources of supply, articles, devices, fixtures, pieces of equipment, materials and processes proposed for each item ofWork using AIA Document G705-2001, List of Subcontractors. The Architect and the College will notify the Contractor in writing if either the College or the Architect, after due investigation, has reasonable objection to any names on such list.

In submitting the names of Subcontractors, the Contractor shall (1) list the name and address of the Subcontractor, (2) provide the name and address of all sub-subcontractors for each significant subdivision of the trade or work, and (3) reference in the form of a list at least 3 jobs similar in size and quality to the Project performed by the subcontractor in the last 5 years, with name and location of work, dollar value and names of the College and the Architect.

In submitting sources of supply, articles, devices, fixtures, piece of equipment and materials, including those under subcontracts and sub-subcontracts, the Contractor shall list (1) the name and address of the source of supply, and (2) the name of the manufacturer of the items.

If the College disapproves of a proposed Subcontractor, it will provide the reason for its decision in writing. The College will not be liable for any extra cost or delays caused by the reasonable disapproval of proposed Subcontractors. The approval of Subcontractors by the College shall not relieve the Contractor of the responsibility for complying with all of the provisions of the Contract Documents including those performed by the Subcontractors. Subcontractors approved by the College may not be changed without prior notice to and written approval by the College.

Payment to the Contractor shall not be made until the list of Subcontractors (as required above) has been provided to the Architect and College.

6.3 Subcontractor Qualifications.

The College may disapprove of a proposed Subcontractor if (i) it has a reasonableobjection to the Subcontractor, (ii) there is evidence of poor performance on other Projects or financial problems, (iii) the Subcontractor has been suspended or debarred by any public agency within the State of New Jersey, (iv) the Subcontractor is not properly licensed and registered to do business in New Jersey or with the New Jersey Department of Labor regarding prevailing

wages, or (v) the Subcontractor has been charged with or convicted of violating any laws, including but not limited to, the New Jersey Prevailing Wage Act, criminal laws, public procurement laws, anti-trust laws, election laws, laws against employment discrimination, environmental laws, tax laws, professional licensing laws, or laws regarding attempts to improperly influence the College or other public officials.

Subcontractors shall utilize qualified, competent craftsmen on the Project.

6.4 Subcontractor Compliance With Contract/Subcontractor Supervisors.

The Contractor shall require its Subcontractors on the Project to comply with all pertinent terms of the Contract Documents, and shall include all appropriate terms and provisions in written subcontracts on the Project to achieve proper Contract performance. Each Subcontractor shall have competent superintendents and foremen supervising their work, and the Contractor shall take appropriate measures if they fail to do so.

6.5 No Contractual Relationship Between The College And Subcontractors.

The Contractor shall enter into written subcontracts with each and every Subcontractor and supplier solely in its own name. No approval by the College of any Subcontractor or supplier and nothing in the Contract Documents shall create any contractual relationship orduties between the Contractor's Subcontractors and the College. Nothing in the Contract Documents shall cause any of the Contractor's Subcontractors or suppliers to be deemed a third- party beneficiary of the Contract between the College and the Contractor, and nothing herein shall give any of the Contractor's Subcontractors or suppliers any rights or claims directlyagainst the College.

6.6 Contingent Assignment of Subcontracts.

Each subcontract agreement for a portion of the Work and any purchase order for materials or equipment may, in the College's sole discretion, be assigned by the Contractor to the College, provided that

(a) assignment is effective only after termination of the Contract by the College for cause or for convenience and only for those subcontract agreements that the College accepts by notifying the Subcontractor and the Contractor in writing and only on such terms and conditions acceptable to the College;
(b) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract;
(c) if the College elects to take an assignment of any subcontract or purchase order, the Contractor shall execute all papers necessary to effectuate the assignment; and
(d) the assignment shall not relieve the Contractor of its existing obligations to any Subcontractor or Supplier, nor shall it cause the College to assume

any of the Contractor's obligations to any Subcontractor or Supplier that arose prior to the termination.

When the College accepts the assignment of a subcontract agreement or purchase order, the College assumes the Contractor's rights and obligations under the subcontract going forward. Upon such assignment to the College, the College may further assign the subcontract to a successor contractor or other entity.

ARTICLE 7
TIME, LIQUIDATED DAMAGES, DELAY CLAIMS AGAINST THE COLLEGE.

7.1 Contract Times.

The Contractor shall begin the Work within 10 days after the issuance of a Notice to Proceed by the College, and shall perform the Work in the Contract Documents by the dates specified in the Notice to Proceed, including Construction Start, Milestone, Substantial Completion and Final Completion Dates (collectively, "Contract Times"). As specified in the Contract for Construction, if the Work is to be performed in phases, the College may issue separate Notices to Proceed for each phase, which shall specify the Construction Start, Milestone, Substantial Completion and Final Completion Dates for that phase. The College may,in its sole discretion and at no cost to the College, choose to delay the issuance of a Notice to Proceed and the Construction Start Date for any phase until after the Contractor has achieved Substantial or Final Completion of any other phase.

7.2 Liquidated Damages For Delay.

If the Contractor fails to Substantially Complete any phase of the Work or the entire Work by the Substantial Completion Date(s) set forth in the applicable Notice to Proceed (as extended by Change Order, if applicable), and the delay is not excused by the College, then the Contractor shall pay the College the amounts specified in the Contract for Construction as liquidated damages for delay for each calendar day that the phase of the Work or the entire Work is not Substantially Completed beyond the applicable Substantial Completion Date

7.3 Delay Claims By The Contractor Against The College -- Limitations.

The Contractor may not assert claims against the College for extra compensation by reason of any delays in its Work resulting from acts or omissions of any third parties irrespective of extensions granted under the Contract, including but not limited to delays caused by third parties such as the Architect, other contractors, utilities and governmental authorities.

The College shall only be required to pay additional compensation for delays caused by the College itself, and only to the extent required by N.J.S.A. 2A:58B-3 (delayed performance caused by the College's own negligence, bad faith, active interference or other tortuous conduct, but not for reasons contemplated by the parties and not for the negligence of others including

others under contract with the College on the theory that such negligence should be imputed to the College). The College shall not be liable for any period of delay when there is a concurrent delay for which the College is not responsible.

When the Contractor is entitled to extra compensation for delay under the Contract for Construction and these General Conditions, it can only assert claims for extra costs at the job site, and may not assert claims for extra costs for home office expenses, home office overhead, lost profit or revenue, or consequential losses as that term is defined by New Jersey law. Any additional compensation under this Article shall also be subject to the provisions in the Contract for Construction and these General Conditions regarding claims, and the provisions in theContract for Construction and these General Conditions regarding the maintenance and availability of cost records.

ARTICLE 8
PROJECT SCHEDULE

8.1 General Project Schedule Requirements.

The Contractor shall schedule the construction Work and determine the most feasible means and order for the Work to complete the Project within the times required by the Contract. The Contractor shall prepare a Project Schedule and monthly schedule updates, which must be approved in writing by the College and the Architect. The Contractor shall perform the Contract and the Work in accordance with the Project Schedule. The Project Schedule should include a schedule of submittals for approval as required herein. The Project Schedule must be submitted before any Work (other than mobilization to site and general layout and site preparatory work) on the Project can begin under the Notice to Proceed. When the Contractor's Project Schedule is approved in writing by the College, it shall become an additional Contract Document and the Contractor shall be required by the Contract to comply with it. The Project Schedule and any updates to it shall be used in determining the amount of the monthly progress payments to the Contractor. The College may also use the Project Schedule and updates to determine if the Contractor is adequately planning and performing the Work in accordance with the Contract Documents.

8.2 Form And Content Of Project Schedule.

The Contractor shall prepare the Project Schedule using Critical Path Method (CPM) scheduling techniques. The Contractor shall utilize the latest revision of Primavera P3 or Microsoft Scheduling software. The Contractor shall prepare a detailed schedule which shows how it will plan, organize, execute and complete the Work. The Project Schedule shall be in the form of an activity oriented network diagram (CPM). The principles and definitions used in this Article shall be as set forth in the Associated General Contractors of America (AGC) publication "Construction Planning and Scheduling", copyright 1994.

The detailed network diagram shall provide sufficient detail and clarity of form and technique so that the Contractor can plan, schedule and control the Work properly, and the College and the Architect can readily monitor and follow the progress of all portions of the

Work. The network diagram shall comply with the limitations imposed by the scope of the Work and contractually specified Milestone, Substantial Completion, and Final Completion Dates. The Project Schedule shall include the arrow or network diagram and the computer produced schedule with dates. The Project Schedule shall include and reflect the following factors:

(a) Project phasing, contract Milestone, Substantial and Final Completion Dates.
(b) The structural breakdown of the Project.
(c) The types of Work to be performed and the labor trades involved.
(d) Reasonable logic and activity durations.
(e) Reasonable coordination of all activities.
(f) Purchase, manufacture and delivery activities for all major materials and equipment.
(g) Deliveries of equipment furnished by the College.
(h) Allowances for work by separate contractors identified in writing by the College at the time of Contract award.
(i) Submittals and approvals of shop drawings, material samples, and other required submittals.
(j) Subcontract Work.
(k) Crew flows and sizes (manpower).
(l) Assignment of responsibility for performing all activities.
(m) Access and availability to Work areas.
(n) Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, and sequences and interdependence of activities.
(o) Testing and inspections.
(p) Phased or total inspection, acceptance, and takeover by the College.
(q) Utilization of the Project Schedule to determine amounts of monthly progress payments.
(r) Activities required of the College and the Architect such as approvals, including reasonable durations for the activities.

Activities should be set forth in working days and have a maximum duration of 60 days, except for non-construction activities such as the procurement and delivery of materials and equipment. All durations shall be the result of definitive manpower and resource planning by the Contractor. The level of detail in the Project Schedule shall be subject to the approval of the College. The Project Schedule shall include a reasonable approach to achieve Milestone, Substantial Completion and Final Completion Dates in the Contract. Any failure of the Contractor to include any element of the Work in the Project Schedule shall not excuse the Contractor from completing that Work and all of the Work needed to complete the Project by theMilestone, Substantial Completion and Final Completion Dates in the Contract.

The network diagram is to be prepared by a computer plotter. The logic diagram will be pure logic and shall not be drawn to time scale. The logic diagram shall be drawn on 30" x 42" size sheets and prepared on a tracing/mylar or similar material suitable for reproducing high quality prints.

8.3 Computerization Of Project Schedule.

The mathematical analysis of the detailed network diagram shall be made by computer, and the tabulation for each activity shall include the following:

(a) Activity numbers.
(b) Activity descriptions.
(c) Durations in work days for each activity.
(d) Earliest start date (by calendar date).
(e) Earliest finish date (by calendar date).
(f) Latest start date (by calendar date).
(g) Latest finish date (by calendar date).
(h) Slack or total float in work days.

The following computer documents shall be prepared as part of the initial Project Schedule submission and each update:

(a) Activity file sort, including sorts listing activities required of the College and the Architect, such as approvals.
(b) Eight week "lookahead" detailed bar chart.
(c) Eight week summary bar chart.
(d) Additional computer sorts requested by the College.
(e) High density CDs or thumb drives of all computer files.

8.4 Weather Inclusion In Project Schedule.

Seasonal weather conditions shall be included in the Project Schedule, including average precipitation, temperature and other weather conditions typical in the geographic area over a 5 year period by month.

8.5 Project Schedule Updates.

The Contractor shall prepare Project Schedule updates monthly until the Project is completed. The first update shall be issued 30 calendar days after the Construction Start Date specified in the Notice to Proceed. Updates shall include the following information:

(a) Actual start and completion dates for activities.
(b) Activity percent completion.
(c) Remaining durations for activities in progress.

Each Project Schedule update shall also include a narrative report that includes the following information:

(a) Summary of Work completed during update period.
(b) Comparison of actual progress and status to activities and dates in original Project Schedule.

(c) Analysis of critical path including effect of activity progress on the Project critical path.
(d) Analysis of secondary critical paths, meaning float within 10 days of the Project critical path.
(e) Analysis of time lost or gained during the update period.
(f) Identification of problem areas.
(g) Identification of change orders and delays impacting or delaying the Project under the Project Schedule.
(h) Solutions or proposed solutions to current problems and delays.
(i) Extensions requested by the Contractor, including activities affected and the amounts, and the reasons for the requests.
(j) Extensions granted by the College for delays and changes, including the activities affected and the amounts, and any effect on the critical path and Contract Milestone, Substantial Completion and Final Completion Dates.
(k) Delays in activities required of the College and the Architect, and activities that they are required to complete in the update period following the issuance of the update.

All Project Schedule updates must be submitted to the College and the Architect for written approval. Project Schedule updates, including the reports which are approved by the College, shall be deemed to be official records of the progress and status of the Project under the Project Schedule and the Contract, and may be utilized by the College in determining if the Contractor is adequately planning and performing the Work under the Contract Documents.

8.6 Meetings/Eight Week Bar Charts.

The Contractor's Project Manager and Scheduler shall arrange for and attend monthly progress and scheduling meetings with the College and the Architect. Monthly progress meetings shall be scheduled 3 to 7 days after monthly Project Schedule updates and reports are issued and provided to the College and the Architect. The purpose of these meetings will be to review past progress, current status, problem areas, delays, measures to reduce delays, future progress, and the Contractor's most recent Project Schedule update and report. At the monthly progressmeetings, the Contractor shall provide a look ahead summary and detailed bar charts showing theWork and activities to be performed and/or completed during the 8 week period following the Project Schedule update.

8.7 Project Schedule Documentation For Contract Payments.

The Contractor will not be entitled to payments under the Contract until a ProjectSchedule has been submitted to and approved in writing by the College. No payment will be made under the Contract if, when the payment is due, a Project Schedule update and narrative report is due under this Article but has not been submitted to and approved in writing by the College. The original Project Schedule shall include a breakdown allocating the total Contract Price among the network activities in the Project Schedule, which must be approved by the College.

8.8 Progress and Recovery Project Schedules.

The Contractor shall perform its Work in accordance with the Project Schedule. If the Contractor's Work falls behind the requirements of the Project Schedule, it shall, at its own cost, institute measures to improve its progress and bring its Work in compliance with the Project Schedule, including but not limited to increasing manpower, increasing work hours per shift, increasing shifts, increasing working days per week, and rescheduling Work activities to perform them concurrently where feasible.

If monthly Project Schedule updates show that the Contractor's progress has fallenbehind the Project Schedule so as to jeopardize the achievement of Milestone, SubstantialCompletion or Final Completion Dates by more than 10 work days, the Contractor shall, if requested by the College in writing, prepare a recovery schedule with acceleration measures to regain the lost time, and shall proceed in accordance with the recovery schedule in addition tothe Project Schedule at its own cost.

8.9 The Contractor's Failure to Provide Project Schedule Updates.

If the Contractor fails to provide monthly Project Schedule updates and reports when required, the College can elect in its sole discretion to employ any of the following remedies: (i) not make progress payments; (ii) on 10 days written notice to the Contractor, retain its own consultant to provide Project Schedule updates and reports and deduct the cost from the Contract Price; (iii) terminate the Contract for default in accordance with the termination provisions in the Contract for Construction and these General Conditions and/or (iv) make a claim on the performance bond.

8.10 Scheduler Qualifications.

The Contractor must utilize a Project Scheduler that satisfies the qualification requirements for the Project. If at any time during the Project it appears that the Contractor's Project Scheduler is not competent to provide the scheduling services required in this Article, the Contractor shall, within 10 days after a written notice and demand from the College, retain a replacement scheduler that is competent to provide the services required. The College may also utilize any of the remedies provided in the Contract for Construction or these General Conditions for the Contractor's failure to provide proper Project Schedule updates and reports.

ARTICLE 9
EXTENSIONS, COMPENSATION FOR CERTAIN EXTENSIONS.

9.1 Delays Warranting Extensions Of Contract Times.

If the Contractor is unavoidably prevented from completing any part of the Work within the Milestone, Substantial Completion or Final Completion Dates by causes beyond the control and without the fault of the Contractor or its Subcontractors, those Contract Times will be extended by amounts equal to the time lost due to such delays, provided the Contractor requests extensions in accordance with this Article. Delays warranting extensions of the Contract Times

include unforeseeable and unavoidable delays caused by the College, the Architect, other contractors employed by the College, utility owners or other third parties, acts of God, acts of governmental authorities, wars, abnormally severe weather conditions of unusual duration (specifically excluding weather conditions of the type and duration that have been encountered in the area in which the Project is located) that prevent timely delivery of materials or equipment necessary to the completion of portions of the Work or hamper access to the Work by workmen or Subcontractors, fires, floods, earthquakes, epidemics, plagues, and other unavoidable casualties.

Apart from an extension of time, no payment or allowance of any kind shall be made to the Contractor as compensation for damages on account of hindrance or delay from any cause in the progress of the Work, whether such delay be avoidable or unavoidable. The Contractor agrees that it will make no claim for compensation, damages for any such delays, and will acceptin full satisfaction for such delays said extension of time.

9.2 Weather Delays.

The Project Schedule shall take into account normally anticipatable adverse weather plus an additional five (5) days of severe and unusual weather conditions that will materially interfere with the timely prosecution of the Work. No time extensions will be granted for time lost due to weather conditions that do not meet the criteria set forth in Article 9.1, and then only to the extent more than five (5) days of delay result from such severe and unusual weather conditions. Owner shall not be required to keep a record of days of precipitation or low temperatures and theburden of proof with respect to weather delays shall be upon Contractor. No time extensionswill be considered for any weather conditions that do not affect Work on the critical path or Contract Times.

9.3 Float Time Use.

Float time in the Project Schedule is not for the exclusive use of either the Contractor or the College. Float time is available for use by both parties to facilitate the effective use of available resources and to minimize the impact of problems and delays that may arise during construction. No time extension will be granted as a result of any problem, change order or delay which only results in the loss of available positive float on the Project Schedule. Float timeshown on the Project Schedule shall not be used by the Contractor in a manner that is detrimentalto the interests of the College or the Project.

9.4 Calculation Of Extensions.

Extensions will be calculated based on the effect of delays on the Project Schedule and the activities in the Project Schedule. If the Contractor is entitled to an extension for a delay based on the nature of the delay under this Article, the activities in the Project Schedule affected by the delay will be extended by the amount they are affected. If extensions of activities in the Project Schedule affect the critical path and delay the Contract Milestone, Substantial Completion or Final Completion Dates, they too will be extended to the extent affected. The critical path and Contract Times will only be extended to the extent that they are actually

affected under the Project Schedule by a delay for which the Contractor is entitled to an extension.

If, for any scheduled activity or period, there are concurrent delays that include delays for which the Contractor is entitled to an extension and delays for which the Contractor is not entitled to an extension, the Contractor will be given an extension for the delays for which it is entitled to extension so that it will not be liable to pay liquidated damages for delay, unless the College eliminates or reduces that delay. A concurrent delay will not justify an extension to the Contractor if it has minimal effect on the completion of the Project, and/or if it would likely have been avoided if it had become apparent that it was having an effect on the progress of the Project and the Final Completion Date.

9.5 Elimination of Delays and Extensions (Acceleration).

If the effect of a delay for which the Contractor is entitled to an extension can be reduced or eliminated by changes in the Project Schedule or other measures which have no material adverse impact on the Contractor in terms of cost or otherwise, the Contractor shall employ thosemeasures so that no extension is required or so that a shorter extension is required. If the Contractor is entitled to extensions for delays, and if the College (in its sole discretion) notifies the Contractor in writing that it prefers to eliminate the lost time to avoid or reduce the extension required, by changes or additional efforts such as acceleration efforts, the Contractor shallperform those measures as a change to the Contract to be compensated under the change order provisions in the Contract for Construction and these General Conditions.

9.6 Requests For Extensions Required.

The Contractor must provide the College with a written notice of delay and request for an extension within 24 hours of the beginning of a delay. The written notice of delay and request for extension must include the nature and cause of the delay, the known extent of the delay, the Work activities on the Project Schedule affected by the delay, and the extent of the effect toeach, and suggestions or proposals to reduce or eliminate the delay. This limited time frame is toprovide the College the opportunity to immediately address the issue and limit the amount oftime in the potential delay and its potential impact on the Project Schedule.

9.7 Compensation For Certain Extensions And Limitations.

Under the Contract for Construction and these General Conditions, the College does not assume responsibility for many types of delays, including additional costs resulting from extensions granted because of those delays. Where the College is responsible for a delay under the express terms of the Contract for Construction and these General Conditions, it will pay extra compensation for any extension granted because of the delay.

Compensation by the College for delays (and extensions) for which it is responsibleunder the Contract for Construction and these General Conditions shall only include additional costs actually incurred at the site, and shall not include home office expense, home office overhead, lost profit or consequential losses. Any additional compensation under this Articleshall be subject to the provisions in the Contract for Construction and these General Conditions

regarding claims, and the provisions in the Contract for Construction and these General Conditions regarding the maintenance and availability of cost records.

No compensation will be paid if an extension for a delay for which the College is responsible is concurrent with another delay for which the Contractor is not entitled to an extension, or is concurrent with another delay for which the Contractor is entitled to an extension but the College is not responsible for the other delay.

If the College requests a change in the Contract Work, potential delays and extensions that result from the change and any resulting extra compensation for the change shall be addressed under the change order provisions in the Contract for Construction and these General Conditions in addition to this Article.

ARTICLE 10
PAYMENTS TO THE CONTRACTOR.

10.1 Contract Price.

The College will pay the Contractor as full compensation for performing the Work the Contract Price as adjusted by approved change orders that increase or decrease the Contract Price. The College will do so in accordance with this Article, any supplemental GeneralConditions regarding payment, and the payment terms in the Contract for Construction. Payment provisions in the supplemental General Conditions that add to or modify this Article shall take precedence over this Article. Payment provisions in the Contract for Construction that add to or modify payment terms shall take precedence over the supplemental General Conditionsand this Article.

10.2 Monthly Progress Payments.

The College will pay the Contractor monthly progress payments as the Work proceeds and will pay for the Work completed, less retainage. The Contractor shall submit monthly invoices using the College's invoice form for the Work completed in each calendar month, and the monthly invoice shall be submitted in accordance with the Contract. The Contractor shall be entitled to monthly progress payments based on the percentage of the Work completed (less earlier payments), and that amount shall be based on the Unit Schedule Breakdown and the update of the Project Schedule for the billing period showing schedule activities completed and progress on incomplete activities, in conjunction with the values assigned to those activities. If there is a discrepancy between the amount due based on the Unit Schedule Breakdown and the amount due based on the Project Schedule update, the Contractor shall only be entitled to the lesser amount unless the College's Representative, in his/her sole discretion, decides otherwise. Payments made by the College shall be used by the Contractor solely for purposes of this Project and for paying Subcontractors, suppliers, and for labor and materials, and shall not be used topay debts owed by the Contractor outside of the Project.

10.3 Unit Schedule Breakdown/CPM Activity Price Breakdown.

Before the Contract for Construction is signed, the Contractor shall submit to the College and the Architect a Unit Schedule Breakdown (schedule of values) utilizing the College's form (AIA Documents G702/G703) which reasonably allocates the Contract Price among the principal categories of Work and materials in the Contract. The Unit Schedule Breakdown must be signed by the Contractor and is subject to written approval by the Architect and the College for use in calculating monthly progress payments under the Contract. The Contractor shall not "front end load" the Unit Schedule Breakdown. The Unit Schedule Breakdown may include line items for mobilization, bonds and insurance.

The Contractor's proposed Project Schedule shall reasonably allocate the Contract Price among the activities in the schedule so that monthly Project Schedule updates can be utilized in connection with the Unit Schedule Breakdown in determining the amount of monthly progress payments. The Contractor's Unit Schedule Breakdown and Project Schedule activity price breakdown must be approved in writing by the Architect and the College before any payments are made under the Contract.

10.4 Invoices For Monthly Progress Payments: Form and Content.

The Contractor must utilize the College's invoice form and the invoice forms (AIA Documents G702/G703 and waiver attachments) must be completed before they are submitted for payment. Each invoice must be signed by the Contractor, and shall certify that the Work and materials represented as having been provided have been provided, and that all Subcontractors and suppliers on the Project have been paid all amounts legitimately due for Work and materials billed to the College in earlier invoices that were paid by the College. The Contractor'ssubmission of an invoice constitutes an affirmative representation and warranty by the Contractor that it performed the Work in compliance with the Contract Documents and applicable laws, codes and regulations.

Invoices for monthly Project payments must include the status of the Work in the Unit Schedule Breakdown and the Project Schedule update for the billing period that shows the activities completed or started and the value of them based on the Project Schedule. Invoices must also include certified payrolls for the Contractor and all Subcontractors for the billing period, affirmative action monthly manning reports, a certification of Subcontractor/supplier payments, the College's acknowledgment of progress payment and release of liens and claims form duly executed by the Contractor, the College's acknowledgment of progress payment and release of liens and claims form duly executed by each Subcontractor and supplier who has furnished labor or materials that are the subject of the current invoice, a list of all materials stored to date including descriptions, values, quantities and location, and any other documents required in the Contract Documents.

The Contractor will be entitled to have an invoice paid if the Architect and the College approve in writing the invoice including the percentage of Work completed, and if the quality of the Work and materials conform to the Contract Documents. The approval of invoices shall not waive claims for defects or deficiencies in the Work or materials provided, or the right to subsequently inspect the Project as a complete and functioning whole.

10.5 Payment For Materials And Equipment Procured But Not Installed.

The Contractor may seek payment in monthly invoices for materials and equipment delivered to the Project site but not yet incorporated into the Work. The Contractor shall include with its monthly invoices a list of the stored equipment, the amount and type of stored materials, and the place where they are stored. Each invoice that seeks payment for materials and equipment delivered to the Project site but not installed or incorporated into the Work shall include a signed bill of sale to the College and an invoice from the supplier. All risk of loss or damage for materials and equipment delivered to the Project site shall remain with the Contractor.

The College will only rarely pay for material or equipment stored offsite, and only when it determines, in its sole discretion, that there is good cause. The College will consider no request to pay for materials or equipment stored off site unless the Contractor includes a written request for such payment with its bid for the Project. If the College does agree to pay for material or equipment stored offsite during the performance of the Contract, it will do so when the Contract for Construction is signed.

If the College does agree to pay for materials and equipment stored offsite, such payments shall be subject to any conditions in the signed Contract, and in all cases, a bill of sale to the College, a paid invoice, insurance and proof the storage facility is bonded will have to be provided to the College when each payment is sought. The location will have to be specified in writing and the material or equipment will have to be inspected by the College. The Contractor and its performance bond surety must agree in writing that they retain all risk of loss or damage, and each payment application must contain a consent to payments for materials stored offsite signed by the Contractor's bonding company.

Payments on account of materials or equipment not incorporated into the Work but delivered and suitably stored at the site, or at some other location agreed upon in writing, may be made by the College subject to the following conditions:

(a) Such materials or equipment shall have been fabricated or assembled specifically for the Project and delivered to storage no earlier than needed for the orderly progress of the Work as demonstrated by the Project Schedule.

(b) Title to such materials or equipment shall pass to the College pursuant to the Contractor's bill of sale, which shall contain guarantee of replacement thereof in the event of damage thereto or disappearance thereof due to any cause. The Contractor shall also affirm that it will pay for such materials or equipment immediately upon receipt of payment therefore from the College.

In the case of offsite storage, the Contractor shall also provide Consent of Surety to such payment and insurance of such materials or equipment against the perils set forth in these General Conditions both while storage and during transportation to the site. Raw materials or other materials or equipment readily duplicated or usable on other projects will be paid for only

after the materials are incorporated into the construction.

10.6 Retainage.

The College will retain 2% of the amount due on each partial payment pending Final Completion of the Contract.

Retainage amounts being withheld by the College shall be released and paid in full to the Contractor within 45 days of the Final Completion Date agreed upon by the Contractor and the College, without further withholding of any amounts for any purpose whatsoever, provided that the Work has been Finally Completed as indicated.

10.7 Payment For Change Order Work.

The Contractor shall invoice for change order work in the monthly progress payment invoices as the change order work is performed, but may only do so after a written change order has been signed by the appropriate College personnel and a TCNJ Purchase Order is issued by the College.

10.8 Final Payment.

Upon Final Completion of all the Work including all change orders, upon final acceptance of the Work by the Architect and the College, and upon the issuance of the Certificate of Final Completion, the Contractor will be paid the fully adjusted Contract Price including any retainage. The Contractor shall submit an invoice for the final payment. The final invoice must be accompanied by the College's acceptance of final payment and release of liens and claims form duly executed by the Contractor, the College's acceptance of final payment and release of liens and claims form duly executed by each Subcontractor and supplier who has furnished labor or materials that are the subject of the final invoice, all warranties, guarantees, manufacturer literature, approved as-built drawings, shop drawings required, and any otherdocuments that the Contractor is required by the Contract Documents to provide to the College atthe time of Final Completion. The final invoice must also include a written signed consent to thefinal payment signed by the Contractor's bonding company.

10.9 Payment Terms.

All invoices and payments shall be subject to the terms of the Contract for Construction and these General Conditions, including the provisions regarding payments, and to the right of the College to withhold payments or to make deductions from payments for damages, defective work, liquidated damages, third-party claims, failure to complete Work, failure to comply with requirements of the Contract Documents, failure to comply with Prevailing Wage Act requirements set forth in the Contract for Construction and these General Conditions, failure to comply with Project Schedule obligations, or other causes authorized by the Contract Documents.

10.10 Payment Based On Partial Acceptance (Limitation).

The College will not accept portions of the Project as Substantially or Finally Complete unless specified elsewhere in the Contract Documents. If the Specifications authorize partial acceptances, they will also specify the terms and conditions of such acceptances.

10.11 Failure To Pay Amounts In Dispute Not To Affect Performance.

The failure of the College to pay any amount requested by the Contractor in an invoice based on a determination that the invoice is improper or some other dispute shall not entitle the Contractor to stop or slow down the performance of the Work.

10.12 Reasons For Withholding Payment.

In addition to the reasons set forth elsewhere in the Contract for Construction and these General Conditions, the Architect or the College may also withhold payments to the Contractor, or, because of subsequently discovered evidence, may nullify the whole or a part of a payments previously issued to the Contractor, to such extent as may be necessary in the Architect's or the College's opinion to protect the College from loss for which the Contractor is responsiblebecause of

(a) defective Work not remedied;
(b) third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the College is provided by the Contractor;
(c) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
(d) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;
(e) damage to the College or a separate contractor;
(f) reasonable evidence that the Work will not be completed within the Contract Times, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
(g) failure to comply with requirements for monthly progress payments pursuant to Article 10.4; or
(h) failure to carry out the Work in accordance with the Contract Documents.

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

If the College withholds or the Architect recommends that the College should withhold payment from the Contractor under subsection (c) above, the College may, after providing the Contractor with written notice and an opportunity to cure, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. However, by doing so, the College is not undertaking any payment obligation on the part of the

Contractor, nor does any Subcontractor have any claims against the College or any right to future joint check payments.

10.13 Set-Off For State Tax Indebtedness.

Pursuant to N.J.S.A. 54:49-19, and notwithstanding any other provision of law to the contrary, if the Contractor or any of its Subcontractors or suppliers are indebted to the State of New Jersey for any State tax, the College may withhold and/or set off any payments due to the Contractor as may be necessary to satisfy such indebtedness and/or pending resolution of the indebtedness.

10.14 Maintenance Of Cost And Accounting Records.

The Contractor shall maintain and retain weekly payroll, material, Subcontractor, supplier, overhead and other cost and accounting records for the Project, and for additional services or extras required by the College, including all costs that the Contractor is entitled to be paid under the Contract. The Contractor shall require its Subcontractors on the Project to do likewise. The Contractor shall also maintain all estimates and takeoffs used in preparing and calculating its bid price for the Contract and change orders. Pursuant to N.J.A.C. 17:44-2.2, the Contractor shall also maintain all documentation related to products, transactions or services under the Contract. The records shall be maintained and shall be made available to the College or its representatives when requested. These records shall be maintained in accordance with generally accepted accounting principles and practices for a period of 5 years after final payment is received by the Contractor, or the duration of any dispute or lawsuit arising out of the Project, whichever is later, and shall be made available to the College or its representatives and the New Jersey Office of the State Comptroller when requested.

Any failure to maintain or produce the records required by this Article shall preclude the Contractor from claiming or being paid or retaining any payments or being paid on any claims that are based on costs or that should be, and expenses or losses incurred by the Contractor or its Subcontractors including extra costs that are or that should be reflected in the records required by this Article or good business practices. This record keeping requirement applies to records related to the basic Contract Price as well as extra compensation for change orders and claims of all kinds.

No claim by the Contractor against the College for payment, whether for Contract Work, extras, changes or claims that is based to any degree on costs that should be recorded in cost records required by this Article or good business practices may be asserted against the College tothe extent the cost records do not exist or are not provided to the College upon demand.

The College reserves the right to audit the records of the Contractor and its Subcontractors at any time and for up to 3 years after the Final Completion of the Project. If an audit reveals overpayment by the College, the Contractor shall refund the cost of the audit andthe overpayment to the College, or the College may deduct the cost of the audit and theoverpayment from future payments under the Contract, or the College may assert claims against the Contractor and/or its surety for the cost of the audit and such overpayments.

10.15 Written Evidence of Payment to Subcontractors.

The College has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers' amounts paid by the College to the Contractor for subcontracted Work. Such evidence shall include acknowledgment of progress payment and release of liens and claims forms duly executed by each Subcontractor and supplier for payments previously made to the Contractor. If the Contractor fails to furnish the College with the written evidence that it has properly paidSubcontractors and material and equipment suppliers, the College shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the College nor Architect 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. The College may, in its sole discretion, issue checksmade payable jointly to the Contractor and a Subcontractor; however, by doing so, the College isnot undertaking any obligation on the part of the Contractor, nor does the Subcontractor have anyclaims against the College nor any right to future joint check payments.

ARTICLE 11
CHANGES.

11.1 Changes Authorized.

The College may at any time authorize and direct changes in the Work or accelerations of the Work that change the scope of the Work and that increase or decrease the Contract Price. All changes including changes in the Contract Price shall be governed by this Article. All changes must be in a written change order signed by the Vice President for Administration, the College's Representative, the Architect and the Contractor. A TCNJ Purchase Order will then be issued by the College and signed by the Contracting Officer, after which time, the Contractor can then bill for the completed change order Work. Any extensions in the Contract Times and increases inthe Contract Price because of extensions resulting from changes shall be governed by Article 9of these General Conditions regarding extensions, but the authorization for the extra compensation itself resulting from an extension must be contained in a change order that complies with this Article as well. The College may elect to have changed Work on the Project that is within the scope of the Contract Documents performed by another contractor. Changes in the Work shall not affect the surety bond protection or insurance coverage required by the Contract Documents.

11.2 Change Request Or Directive.

The College may request a change in the Work or materials to be provided under the Contract Documents by a written Contract Change Directive ("CCD") signed by the College's Representative. If the College is of the opinion that no change in the Contract Price or Contract Times is required because of the change request, it shall so state in the CCD. A CCD may include provisions regarding the scope of the changed Work or materials, and may also include conditions including time parameters. A CCD may provide that specified Work shall stop until further notice, but the Contractor shall not stop or delay any Work because of a CCD unless the CCD provides that Work should stop because of the change. A CCD may provide that the performance of changes shall not commence until a change order is issued and a subsequent

TCNJ Purchase Order is issued and signed by the Contracting Officer, or that changed Work should proceed before a change order and TCNJ Purchase Order are issued by the College to maintain the progress of the Project.

11.3 Change Orders Which Are Protested.

If the Contractor protests the terms of a change order, it shall notify the College of its protest in writing within 2 business days of the issuance of the Change Order. It shall describe the terms that it objects to and the reasons for its protest. It shall include supporting documentation if appropriate, including detailed justification for any Contractor requested additional compensation based upon unavoidable additional costs. The College may elect to direct the Contractor in writing to perform the change order requirements despite the protest. If it does so, the Contractor's right to pursue further relief based on the protest shall be preserved and the Contractor shall immediately proceed with the change Work

11.4 Changes Affecting Contract Times.

Changes and change orders shall not affect or extend any of the Contract Times unless the change order itself specifies that it changes Contract Times. If a change order issued by the College delays the completion of any activity in the Project Schedule, the time allowed for that activity shall be extended, and if a delay in that activity delays other activities, the critical path or the Completion Dates in the Contract, they too will be extended. The Contractor shall make reasonable efforts in scheduling changed Work so that it does not delay or extend activities in the Project Schedule critical path, including any Milestone Dates, the Substantial Completion Date and the Final Completion Date. The Contractor shall also make alternate proposals for change order Work that include acceleration for the changed Work where feasible to achieve this goal, and shall include the cost of such efforts in its change order requests and proposals.

Change orders must specify whether they result in any delay (or extension) to any critical path activities in the Project Schedule, including an identification of the activities and the amount of delay in each. If no delay or extension is set forth in a change order, it will be deemed an agreement by the College and the Contractor that no delay or extension results from the change order.

11.5 Contractor Initiated Change Order Requests.

If the Contractor contends that any directive or communication from the College or Architect, or any condition, event or circumstance entitles it to a change order changing the scope of the Work, terms of the Contract Documents, Contract Price or Contract Times, it shall submit a written change order request to the College's Representative within 5 days of the event upon which the request is based. The written request shall specify the terms of the change order requested, and include all documentation and information that the Contractor seeks to have considered in support of the request, or that is necessary to a proper consideration of the request.

11.6 Change Order Amounts.

All price changes or amounts in change orders shall be based on (i) lump sum, (ii) actual work time and materials plus mark-ups for overhead and profit, or (iii) unit prices times actual quantities that may or may not include separate mark-ups for overhead and profit. If a change order price is to be based on a lump sum price or a unit price, the College may request the submission of such documentation regarding market price or cost which it reasonably deems necessary to determine a lump sum or unit price. If a change order is based on actual work time and material costs, it will include a not-to-exceed price.

Applications for payment for change order Work shall be included in monthly progress payment invoices as the change order work is performed, but only after a TCNJ Purchase Order has been issued to the Contractor by the College. For change orders based on time and material costs or unit prices times actual quantities, the time spent, material provided, and quantities performed shall be recorded in daily time slips, material invoices, and quantity of work performed tickets that are signed by the College's Representative to certify that the Work and materials were provided, and the quantities. Labor costs and material costs for change orders shall be based on actual costs to the Contractor without any mark-ups except as provided in this Article.

Mark-ups may be added to time and material costs where a change order is authorized to be paid on a time and material basis, and also unit price change orders if the change order price term expressly authorizes mark-ups as a separate additional charge to be added to the unit price. When mark-ups for overhead and profit are authorized, the standard mark-up for overhead and profit shall be 15% of net costs properly invoiced in the change order. The schedule for mark ups is as follows:

- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Contractor;
- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor for the Contractor; and
- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Subcontractor's subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor's subcontractor for the Subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor for the Contractor.

There shall be no additional mark-ups for materials or supplies. Bond and insurance costs are included in the noted mark ups above. Refer to Division 1 Specifications also for further delineation of items included in mark-ups.

THE CONTRACTOR MUST USE THE COLLEGE'S CHANGE ORDER FORM INCLUDED IN THE PAYMENT PROCEDURE DOCUMENTS.

11.7 Right To Audit Extra Costs (Before And After Payment).

The College reserves the right to audit all change orders and additional costs claimed and/or paid under the Contract at any time. The obligation of the Contractor, Subcontractors andsuppliers to establish, maintain and produce cost records and remedies for failing to do as specified elsewhere in these General Conditions and the Contract for Construction shall govern.If an audit reveals that actual costs invoiced to the College and/or paid by the College in change orders exceed the actual costs incurred, the Contractor shall refund the excess, or the College may deduct the excess from future payments under the Contract, or the College may assert claims against the Contractor and/or its surety for such overpayments.

11.8 Change Orders With Both Price Increases and Decreases.

If a change order reduces the scope of the Work or materials to be provided by the Contractor under the Contract, the change order shall provide for a reduction in the Contract Price in the amount of the actual reduction in cost. If a change order results in both added costs and reduced costs, they shall be combined for a net plus or minus Contract Price adjustment, and when mark-ups are applicable, they shall only be added to a net increase in the Contract Price which results from a combination of additions and deductions in the change order.

11.9 Waiver Of Rights In Connection With Change Orders Issued Without Protest.

The Contractor shall not be entitled to seek any additional compensation or any extension of the Contract Times beyond the amounts and any extensions included in a change order signed by the College or a written change order request submitted by the Contractor to the College for approval, the intent being that the Contractor must disclose all additional costs and delays claimed to result from a change so that the College can take measures in considering the change to effect cost savings and avoid delays. The failure to include extra costs or delays in a change order request will preclude the Contractor from later claiming such costs or delays in connection with the change in any form or fashion.

ARTICLE 12
COMPLETION.

12.1 Substantial Completion.

When the Contractor believes that the Project (or a specific phase of the Work, if the Work is to be performed in phases) is Substantially Complete, meaning all essential requirementsof the Work have been sufficiently completed so that the Project (or a specific phase) can be occupied and used for its intended purpose (and as further defined in the College's Division 1 specifications for capital projects), it can make a written request to the Architect and the College to conduct an inspection and to issue a Certificate of Substantial Completion. The Contractor's request shall list all Work and requirements of the Contract Documents that remain to becompleted or corrected and an estimate of the value of the incomplete items and the dates by which those items of the Work will be completed, but in no event shall it be more than thirty (30)days from Substantial Completion.

The Architect and the College will conduct an inspection, and if they determine the Contractor has Substantially Completed the Project (or a specific phase of the Work, if the Work is to be performed in phases), the College will issue a Certificate of Substantial Completion. If the Architect and the College determine that the Contractor has not achieved Substantial Completion, the College will notify the Contractor in writing and will list the Work and requirements of the Contract Documents that must be completed for Substantial Completion and provide a punchlist. The Architect and the College will also assign a value to the incomplete items to be added to the 2% retainage held after the Certificate of Substantial Completion is issued. The College and the Architect will re-inspect when the Contractor notifies them in writing that those items have been completed.

Any failure of the College or Architect to include incomplete or deficient items in a Certificate of Substantial Completion or a notice regarding a Substantial Completion inspection shall not affect the Contractor's obligation to properly complete all requirements of the Contract.

The College will not issue a Certificate of Substantial Completion unless it can occupy and use the Project (or the phase of the Work) for its intended purpose, and the Contractor agreesthat the College's use and occupancy of the Project (or the phase of the Work) shall not affect the Contractor's obligation to complete the Project and requirements of the Contract Documents. The Contractor also agrees that its completion of the Project will not unreasonably interfere with the College's occupancy and use of the Project (or the phase of the Work) and that the College's occupancy will not impede the Contractor's completion of the Work to Final Completion.

Unless otherwise specified in the supplemental General Conditions, a Certificate of Substantial Completion will not be issued unless an unqualified temporary or permanent certificate of occupancy is issued, and the College is able to use and occupy the Project (or the phase of the Work) without interruption.

The issuance of a Certificate of Substantial Completion shall not void or alter any of the other terms of the Contract Documents, including but not limited to terms relating to warranties, or relieve the Contractor of its obligation to complete the Work or remedy defective Work or materials, unless such terms are expressly modified by the Certificate of Substantial Completion.

Guarantee periods for equipment, workmanship and materials shall commence when the Certificate of Substantial Completion is issued or from the completion and acceptance of equipment, workmanship or materials, whichever is later, unless otherwise specified in the supplemental General Conditions or the Certificate of Substantial Completion.

The rights of the Contractor regarding payments upon the issuance of the Certificate of Substantial Completion shall be as provided in the payment provisions of the Contract for Construction and these General Conditions.

12.2 Final Completion.

The Contractor shall notify the Architect and the College in writing when it has completed the entire Project (or a specific phase of the Work, if the Work is to be performed in

phases) and has satisfied all of the requirements of the Contract Documents for Final Completion. The Architect and the College will then conduct an inspection, and if they determine that the Contractor has completed the entire Project (or a specific phase of the Work,if the Work is to be performed in phases) and has satisfied all of the requirements of the ContractDocuments for Final Completion, the College will then issue a Certificate of Final Completion.If any items remain incomplete or unsatisfactory, the College will notify the Contractor inwriting and list the incomplete or unsatisfactory items. The Contractor shall immediatelycomplete and correct any unfinished items and notify the Architect and the College in writing and request a follow-up inspection for Final Completion.

The Certificate of Final Completion will not be issued until all documents required by the Contract Documents have been provided, including the College's acceptance of final payment and release of liens and claims forms duly executed by the Contractor and any Subcontractorsand suppliers who have furnished labor or materials under the Contract, warranties, maintenance and operating instructions, certificates, insurance, shop drawings required, and as-built drawings approved by the Architect. Final Completion must include leaving the entire Project site and the Project (or the phase of the Work) clean, neat and orderly. All distortions, cracks, delaminating and deteriorations of finished surfaces must be remedied. All broken items shall be repaired. All paint spots, stains and plaster must be removed. All unused equipment and excess material shall be removed. The Project and the Project site (or the phase of the Work) shall be clean and finished.

If the Contractor unreasonably delays completing and correcting items needed for the issuance of the Certificate of Final Completion, the College may unilaterally issue a Certificate of Final Completion that lists incomplete and defective items, and that deducts any applicable liquidated damages and the cost of remedying incomplete and defective items from the final amount due to the Contractor under the Contract.

Final payment will not be made until the Certificate of Final Completion is issued, and the final payment shall be subject to the payment provisions in the Contract for Construction and these General Conditions.

ARTICLE 13
SUSPENSION AND TERMINATION OF CONTRACT.

13.1 Suspension By The College.

The College shall have the right to stop or suspend the Work in whole or in part at any time. The Work may only be stopped or suspended by a written directive of the College's Representative, except in an emergency. The College's Representative may stop or suspend the Work in whole or in part on an emergent basis, either verbally or in writing, but any such emergent suspension or stop Work order shall be confirmed by a written directive from the College's Representative within 48 hours. The College may stop or suspend the Work because of any conditions affecting health or safety on or off site, any dangerous condition, any environmental hazard, the convenience of the College, or the public interest. If a directive to

stop or suspend all or part of the Work includes directions to secure the site, the Contractor shall perform the Work required in the directive. The Contractor shall also maintain the safety and security of the Project during the suspension for the protection of the site, Work in place, materials and equipment on site, persons on or near the site, and the College's property.

If all or part of the Work is suspended in response to a problem or condition caused by the Contractor's performance of its Contract, or parties other than the College itself, or conditions over which the College has no control, the Contractor will not be entitled to any additional compensation for the suspension. If the College directs the suspension of Work because of the improper performance of the Contract by the Contractor or those performing its Contract, the Contractor will not be entitled to any extension of any Contract Times or additionalcompensation by reason of the suspension. If a suspension is directed for reasons other than the fault of the Contractor or others involved in its performance of the Contract, the Contractor will be entitled to an extension under and to the extent authorized in Article 9, and additional compensation under and to the extent authorized by Article 11.

13.2 Termination For Convenience.

The College may, by a written directive, terminate the Contract at any time before completion for the College's convenience or where it concludes that it is in the public interest to do so. The Contractor shall complete any items of Work specified in the notice of termination for convenience and any Work necessary to make the site safe for all persons and property at or near the Project site when the College terminates the Contract for convenience under this Article.

Absent the Contractor fault or violation of the Contract, the Contractor shall be paid in full for all properly completed Work, subject to the payment provisions in the Contract for Construction and these General Conditions. The Contractor will not be entitled to payment for costs and mark-ups for Work or materials not provided before the termination, or costs for Work and materials not provided unless the Contractor cannot avoid liability to pay those costs, or profit or overhead on the portion of the Contract that will not be performed because of the termination, or other types of damages. The extra compensation payable to the Contractor in connection with a termination for convenience may include the cost of materials or equipment purchased for the Project before termination but not installed if the Contractor cannot otherwise use or sell them.

The Contractor will also be entitled to reasonable termination costs in reasonable amounts for additional direct costs in connection with the termination, but not administrative, home office or overhead costs, lost profit, or consequential damages. In addition, any claims shall be subject to the provisions in the Contract for Construction and these General Conditions regarding claims and the maintenance of cost records.

The Contractor shall include provisions similar to this Article in subcontracts and supply contracts for the Project. When a termination for convenience is directed by the College, the Contract shall be closed out in accordance with the provisions of the Contract for Construction and these General Conditions regarding payment and Project completion.

13.3 Termination For Cause.

The College may terminate the Contract for cause if the Contractor (i) commits violations of the Contract Documents, (ii) fails to perform the Work in accordance with the Contract Documents including the Project Schedule, (iii) fails to comply with applicable laws, rules or regulations, (iv) fails to pay Subcontractors or suppliers to the extent reasonably required, (v) becomes insolvent or becomes a debtor in a bankruptcy proceeding, (vi) fails to pay its debts, (vii) is found to have made false or misleading statements to the College in writing in obtaining the Contract or payments, (viii) fails to comply with employment discrimination laws, (ix) fails to pay prevailing wages, (x) fails to maintain or renew the required insurance, (xi) fails to maintain proper protection for the safety of persons or property on the site, (xii) fails to comply with reasonable and authorized directives of the College under the Contract, or (xiii) assigns its rights or interests under the Contract or payments under the Contract to any third party.

If the College terminates the Contract for cause, it shall first send a notice of intent to terminate to the Contractor and the Contractor's surety. The notice shall direct the Contractor to remedy or eliminate the deficiency within a specified time if the problem is one that can be eliminated. If the Contractor fails to reasonably comply with the directive and notice, the College may after 10 days issue a notice of termination to the Contractor and its surety which terminates the Contract effective immediately and specifies the reason for the termination.

If the Contract is terminated, the Contractor shall secure the site and take measures to leave the site safe for persons, material, Work in place and equipment before departing the site, and shall remove all tools and equipment within 5 days of the termination effective date. The Contractor shall not remove any materials or equipment stored on site unless directed to do so bythe College. When the Contract is terminated, the Contractor shall deliver materials purchasedfor the Project and paid for by the College, but not stored on site, together with all appropriate warranties and guaranties to any location designated by the College.

If the Contractor's surety does not take over the completion of the Work in accordance with this Article, the College may appropriate any or all materials on the site that may be suitable and acceptable and may enter into an agreement for the completion of the Work with another contractor, or use other methods to complete the Work.

All damages, costs and charges incurred by the College together with the cost of completing the Work, will be deducted from any monies due or which may become due to the Contractor for Work properly completed by it before the termination. If such expenses exceed the sum available from the unpaid Contract Price, the Contractor and its surety shall be liable andshall pay to the College the amount of such excess in addition to other damages.

The rights and remedies of the College in connection with a termination for cause shall be in addition to other rights and remedies which it has under law, the Contract, and the Contractor's bond.

If the College terminates the Contract for cause and it is subsequently determined by a court that the Contractor was not in default, or that the termination was legally unjustified, the termination will be deemed to be a termination for convenience under this Article, and the rights

and remedies of the Contractor and its surety for the termination will be limited to those which exist in connection with a termination for convenience. If the College terminates the Contract for cause, the Contractor may not file a suit to recover on any claims arising out of the Project before the Work is Substantially Complete.

13.4 Surety Takeover Following Termination For Cause.

If the College terminates the Contractor for cause, the Contractor's performance bond surety may elect to takeover and complete the Contractor's Work and obligations under its Contract. If the surety elects to take over the completion of the Contract, it may only do so on the following conditions:

(a) The surety must notify the College that it will take over completion of the Contract by a written notice of intent signed by a representative authorized to bind the surety within 5 calendar days of the surety's receipt of the College's notice of termination.

(b) The surety and the College must execute a written takeover agreement within 10 days after the surety sends its notice of intent to takeover. The takeover agreement signed by the surety and the College, must:

i. contain an acknowledgement and agreement by the surety to assume the obligation to complete the balance of the Work under the Contract and to perform all of the Contractor's obligations under the Contract at the surety's sole cost and expense, and to utilize only contractors approved by the College to complete the Work, which approval shall not be unreasonably withheld;

ii. provide that the surety is entitled to be paid the unpaid balance under the terminated Contractor's Contract in accordance with and subject to the terms of the Contract for Construction and these General Conditions;

iii. provide that the surety is not relieved of any of its obligations under its payment and performance bond for the Project, and that the College retains its right to withhold money for Contract payments to compensate for damages or for other reasons where authorized under the Contract for Construction or these General Conditions; and

iv. provide that it is without prejudice to and is subject to all of the rights and remedies of the College, the surety, and the defaulted Contractor, and the surety may not require the College to agree to a takeover agreement that seeks to extinguish any such rights.

(c) The surety must also pay without delay all obligations of the terminated Contractor for Work and materials on the Project, subject to a reasonable allowance of time to investigate and verify claims.

13.5 Suspension By The Contractor For Non-Payment.

If the Contractor is not paid sums due under an approved invoice within thirty (30) days of the billing date, it may suspend performance without penalty for breach of Contract, but only

after providing the College with 7 days written notice of non-payment, and only in the event that the College fails to furnish the Contractor, within that 7 day period, with a written statement of the amount withheld and the reasons for the withholding. Nothing herein shall be construed to excuse the Contractor's nonperformance, or to limit the College's rights and remedies relating to such nonperformance, with regard to any monies withheld from the Contractor upon the proper notice provided under this Article, or with regard to any Contractor claim disputed by the College.

ARTICLE 14
WARRANTY/DEFECTIVE WORK AND MATERIALS

14.1 General Work One Year Warranty; HVAC Systems Two Year Warranty

The Contractor warrants and guarantees for a one year period that all Work, materials and equipment (and for a two year period that all HVAC work) conform to the Contract Documents and will not fail or manifest defects, that the Project and all its components will be fit for their intended functions, and that all material and equipment will be new and of good quality.

The general one year warranty period (or two year warranty period for HVAC work) shall commence when the Certificate of Substantial Completion is issued, and the one year period (or two year period for HVAC work) shall commence on that date for all components of the Project, including any equipment activated and operated before Substantial Completion, such as HVAC systems, electrical systems and elevators.

During the one year warranty period (or two year warranty period for HVAC work), the Contractor shall repair and remedy at its own expense any premature failure, defects or deficiencies in any Work, materials or equipment that are discovered or that develop during the one year period (or two year period for HVAC work), and shall do so within 5 days after receipt of a written warranty claim from the College. The Contractor shall also repair damages caused by any failure or defect covered by this warranty. A failure to provide the warranty service required shall constitute a breach of this warranty obligation as well as other applicable provisions of the Contract. This warranty shall not cover failures caused solely by substantial misuse or abuse by the College.

This general one year warranty (or two year warranty for HVAC work) is intended to provide the College with prompt warranty service for all aspects of the Project for the one year period (or two year period for HVAC work). It is not intended to limit or extinguish any additional warranties required by any of the Contract Documents, or provided by manufacturers of systems, equipment or materials provided under the Contract. It is not intended to eliminate or reduce the College's rights and remedies under the Contract Documents and law for defects and deficiencies in the Work, materials and equipment, or the time period of the Contractor's general responsibility and liability.

14.2 Defective Work, Materials And Equipment.

Apart from the general one year warranty (or two year warranty for HVAC work)provided for in this Article, the Contractor shall be responsible for defective Work, materials andequipment and any failure of these items to comply with the Contract Documents. This obligation shall extend beyond Substantial Completion, Final Completion and the general one year warranty (or two year warranty for HVAC work) in this Article.

If defects in the Work, materials or equipment or non-conforming items are discovered during construction and before Final Completion, the Contractor shall promptly correct them at its own expense. If the Contractor fails to correct defective or non-conforming Work, material or equipment in response to a written notice form the College, either during construction or after Final Completion, the College may employ others to provide the remedial work and the Contractor and its surety shall be liable for the cost thereof and damages incurred by the College.The Contractor and its surety shall also be liable for the cost of making good all Work and material destroyed or damaged by defects or the correction of defects.

If any portion of the Contractor's Contract Price remains in the custody of the College, either earned or unearned, the College may deduct money paid to others to remedy defects after notice is sent to the Contractor and damages incurred by the College when the Contractor fails to provide a remedy in response. The Contractor's responsibility for defects and non-conforming Work, material and equipment shall not be limited in time except by applicable law.

The Contractor's responsibility for defective Work shall not be affected by either the performance or the lack of performance of inspections by the College or the Architect. The issuance of payments, a Certificate of Substantial Completion or a Certificate of Final Completion shall not constitute acceptance of Work, material or equipment that is deficient ornot in compliance with the Contract, or limit the Contractor's warranty or the other Contract obligations.

ARTICLE 15
INDEMNIFICATION/LIABILITY TO THIRD PARTIES.

15.1 The Contractor's Indemnification Obligation.

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the College, the State of New Jersey, the New Jersey Educational Facilities Authority, Trenton State College Corporation, and any other persons or entities designated by the College, and the officers, directors, principals, attorneys, agents, servants, and employees of any of them (collectively the "Indemnified Parties") from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from: (1) performance of the Work, whether such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom caused in whole or in part by the negligent or willful acts or omissions of theContractor, Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder or (2) any one or more of the items set forth in

this Article. 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 Article.

In claims against any person or entity indemnified under this Article by an employee of the Contractor, a Subcontractor or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Article shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or forthe Contractor or Subcontractor under workers' compensation acts, disability benefit acts orother employee benefit acts, nor shall the same be limited by the types or limits of insurance carried or to be carried by the Contractor or any Subcontractor pursuant to the Contract Documents or otherwise.

The indemnity, defense, and hold harmless obligation set forth in this Article shall be supplemented by the following:

(a) any claims or liens of Subcontractors, except to the extent that the non-payment upon which the claim or lien is predicated resulted solely from the College's wrongful failure to pay the Contractor sums due under the Contract;
(b) any fines, penalties, liquidated damages, assessments or other executions imposed by any governmental authority having jurisdiction over the Project by reason of the Contractor's failure to comply with any requirement of the Contract;
(c) any losses, damages, or expenses incurred by reason of the Contractor's failure to obtain and maintain in force or cause to be obtained and maintained, the insurance required by the terms of the Contract;
(d) any losses, damages, or expenses incurred by reason of any failure (whether or not specifically identified herein) by the Contractor to perform its obligations under the Contract Documents or any breach of the Contract;
(e) any claims, damages, or expenses incurred by reason of the Contractor's infringement or alleged infringement of any patent, copyright, or other intellectual property or similar rights; and
(f) any claims, damages, liquidated damages, penalties, or fines assessed against the College, directly or indirectly, solely or partially by reason of the Contractor's failure to comply with any applicable laws, codes, statutes, or regulations.

If any judgment is rendered against the Indemnified Parties for which indemnification is required under this Article, the Contractor shall satisfy and discharge it. The Contractor shall reimburse the College for reasonable attorney fees, costs and expenses incurred by the Indemnified Parties in the defense of such suit or claim.

The College shall give written notice to the Contractor of claims and suits for which indemnification may be claimed pursuant to this Article.

The foregoing obligations shall survive the completion of the Work and final payment to the Contractor (or the sooner termination of the Contract) with respect to all matters accrued during the term of the Contract and such obligations shall not be construed to negate, abridge or reduce any other rights, obligations or indemnity which would otherwise exist as to a party or person indemnified by this Article.

15.2 The Subcontractor's Indemnification Obligation.

The Contractor shall cause the indemnification obligations set forth in this Article to be included in all contracts with its Subcontractors.

ARTICLE 16
INSURANCE AND BONDS.

16.1 The Contractor's Insurance.

The Contractor shall purchase from, and maintain with a company or companies lawfully authorized to do business in the State of New Jersey, insurance for protection from claims under workers' compensation and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and claims for damages, including the Work itself, to property which may arise out of or result from the Contractor's operations and completed operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them, until at least 1 year afterthe Final Completion and acceptance of the Project. This insurance shall be written for not less than the limits set forth below or as required by law, whichever coverage is greater, and shall include contractual liability insurance applicable to the Contractor's obligations under Article 15 (Indemnification). The Contractor expressly agrees that any insurance protection required by the Contract Documents shall in no way limit the Contractor's obligations under the Contract, and shall not be construed to relieve the Contractor from liability in excess of such coverage. Nor shall it preclude the College from taking such actions as are available to it under any other provisions of the Contract for Construction, these General Conditions or the law.

16.1.1 Types and Minimum Amounts of Insurance:

(a) **Commercial General Liability Insurance (CGL).** Commercial General Liability insurance ISO CG 00 01 12 07 or later occurrence form of insurance including contractual liability with limits of at least five million dollars ($ 5,000,000) per occurrence, and at least five million dollars ($ 5,000,000) in the aggregate. The general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. The CGL policy shall also include products/completed operations with limits of at least one million ($ 1,000,000) in the aggregate. This insurance shall be maintained for at least 1 year after the Final Completion of the Project.

(b) **Automobile Liability Insurance.** Comprehensive Automobile Liability insurance covering owned, non-owned, and hired vehicles. The limits of liability shall not be less than one million dollars ($ 1,000,000) combined single limit for bodily injury and property damagefor each occurrence.

(c) **Workers Compensation/ Employer's Liability.** Worker's Compensation Insurance applicable to the laws of the State of New Jersey and other Stateor Federal jurisdictions required to protect the employees of the Contractorand any Subcontractor, sub-subcontractor or supplier who will be engaged in the performance of the Contract. The certificate must so indicate that noproprietor, partner, executive officer or member is excluded. This insurance shall include Employers' Liability Insurance with a limit of liability not less than one million dollars ($1,000,000) bodily injury, each occurrence, one million dollars ($1,000,000) disease, each employee, and one million dollars ($1,000,000) disease, aggregate limit.

All required insurance coverages must be written by insurance companies acceptable to the College. All insurance companies must have a minimum A.M. Best's financial strength rating of A- or better, or an equivalent rating from another respected rating agency, and an A.M. Best's size rating of VII or greater.

16.1.2 Additional Insureds. All insurance required herein, except Worker' Compensation, shall name The College of New Jersey, the State of New Jersey, the New Jersey Educational Facilities Authority, Trenton State College Corporation and any other persons or entities designated by the College as additional insureds.

16.1.3 Cancellation. The certificates of insurance shall provide for 30 days written notice to the College before any cancellation, expiration or non-renewal during the term the insurance is required by the Contract.

16.1.4 Evidence of Insurance. The Contractor shall when the Contract for Construction is signed and before beginning the Work required under the Contract, provide the College with valid certificates of insurance signed by an insurance provider or authorized agent or underwriter to evidence the Contractor's insurance coverage as required in this Article, and also copies of the policies themselves. The certificates of insurance shall specify that the insurance provided is of the types and in the amounts required in this Article, and that thepolicies cannot be canceled except after 30 days written notice to the College. The Contractor shall also be required to provide the College with valid certificates of renewal when policies expire. The Contractor shall also, when requested, provide the College with additional copies of each policy and all endorsements required under the Contract, which are certified by an agent or underwriter to be true copies of the policies and endorsements issued to the Contractor.

16.1.5 Remedies for Lack of Insurance. If the Contractor fails to renew any of its required insurance policies, or any policy is canceled, terminated or modified, the College may refuse to pay monies due under the Contract. The College, in its sole discretion and for its sole benefit, may use monies retained under this Article to attempt to renew the Contractor's insurance or obtain substitute coverage if possible for the College's sole benefit, and may invoke other applicable remedies under the Contract for Construction and these General Conditions including claims against the Contractor and its surety. During any period when the required insurance is not in effect, the College may also, in its sole discretion, either suspend the Work under the Contract or terminate the Contract.

16.2 The Subcontractor's Insurance.

The Contractor shall ensure that its Subcontractors purchase and maintain insurance on the same terms and with coverages customary for each trade as required by the Contractor under the Contract. The Contractor shall contractually obligate its Subcontractors to indemnify, defend, and hold harmless the College upon the same terms and conditions that the Contractor is required to do so as provided in Article 15 of these General Conditions (Indemnification).

16.3 Payment And Performance Bond.

The Contractor is required to furnish the College with a payment bond and a performance bond from an approved surety as described in this Article and in the bid documents. The bonds shall conform to N.J.S.A. 2A:44-147. The Contract will not become effective until these bonds are provided to and approved in writing by the College. The bonds must also be accompanied bythe surety disclosure statement and certification required by N.J.S.A. 18A:64-68.

ARTICLE 17
DISPUTE RESOLUTION.

17.1 Mediation.

If a dispute or claim arises out of or relates to the Contract, or the breach thereof, and if the dispute cannot be settled through negotiation, the dispute or claim may, at the College's sole option, be subject to mediation administered by the American Arbitration Association under its Construction Industry Mediation Rules as a condition precedent to binding dispute resolution. The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in Mercer County, New Jersey, at the offices of the College's attorneys, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable in any court having jurisdiction thereof.

17.2 Method Of Binding Dispute Resolution.

For any dispute or claim, not resolved by mediation pursuant to this Article, the method of binding dispute resolution shall be litigation in the state or district courts of the State of New Jersey, unless the College, in its sole discretion, decides to submit the dispute or claim to arbitration pursuant to this Article.

17.3 Arbitration (If The College Elects To Arbitrate).

If the College decides, in its sole discretion, to submit a dispute or claim to arbitration rather than litigation as provided above, the arbitration shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Contract unless the parties mutually agree otherwise. A demand for arbitrationshall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The arbitrator shall be a New Jersey licensed attorney with at least twenty (20) years' experience practicing in construction law. In the event that the parties mutually agree to use a panel of three arbitrators, then the construction attorney will be the

presiding arbitrator, one of the arbitrators will be a registered architect and the other will be a contractor, all of whom shall be neutral and independent. This Article shall not preclude the College or Contractor from instituting legal action to discharge an invalid construction lien. The arbitration hearing shall be held in Mercer County, New Jersey, at the offices of the College's attorneys, unless another location is mutually agreed upon.

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

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

The award rendered by the arbitrator(s) shall be a reasoned award and shall include a statement of findings of fact and conclusions of law and shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

17.4 Consolidation Or Joinder.

The College, in its sole discretion, may consolidate an arbitration conducted under the Contract with any other arbitration to which it is a party provided that (i) the arbitration agreement governing the other arbitration permits consolidation, (ii) the arbitrations to be consolidated substantially involve common questions of law or fact, and (iii) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

The College, in its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required ifcomplete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person orentity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

The College, in its sole discretion, may grant to any person or entity made a party to an arbitration conducted under this Article, whether by joinder or consolidation, the same rights of joinder and consolidation as the College under the Contract.

17.5 Work During Pendency Of Dispute.

Unless otherwise instructed by the College, the Contractor shall carry on its Work during the pendency of any dispute hereunder, and the College shall continue making payments to the Contractor of undisputed amounts.

17.6 Prompt Payment Claims.

Notwithstanding the foregoing, disputes regarding only whether a party has failed to make payments required pursuant to New Jersey's Prompt Payment Act may be submitted to alternative dispute resolution as provided in N.J.S.A. 2A:30a-2(f). In such event, the College and the Contractor shall share equally the fees and expenses of the selected mediator. Provided, however, that nothing herein shall be construed, in whole or in part, as a waiver, release or modification of the provisions of the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq., as it governs claims against the College.

17.7 The Contractor's Claims: Procedures And Limitations.

Claims by the Contractor against the College shall be subject to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq., including the notice and time for suitprovisions. For the purpose of determining the time within which the Contractor must file suit under the New Jersey Contractual Liability Act, "completion of the contract" shall be deemed to have occurred upon achievement of Substantial Completion as defined in these General Conditions.

The Contractor also agrees that it shall not be entitled to assert claims against the College for any compensation beyond that provided for in the Contract by reason of the acts or omissions of any third parties, including but not limited to the Architect and any other contractor on the Project. The Contractor may not assert claims for extra costs for home offices expenses, home office overhead, lost profits or revenue, or consequential damages as that term is defined in law. All claims shall also be subject to all other pertinent provisions of the Contract for Construction and the Contract Documents including these General Conditions. The Contractor also agrees that it may not assert any claims for extra costs or damages unless it maintains all the records of its estimated and actual costs as required by the Contract for Construction and these General Conditions.

17.8 Dispute Resolution Process In The Contractor's Subcontracts.

The Contractor shall include this dispute resolution process in all of its contracts with any Subcontractors or suppliers on this Project.

ARTICLE 18
MISCELLANEOUS.

18.1 Prevailing Wage.

The Contractor and its Subcontractors shall comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 through 56.57. Workers employed by the Contractor or any Subcontractor or sub-subcontractor in the performance of services directly on the Project must be paid prevailing wages. As required by N.J.S.A. 34:11-56.27 and 56.28, the Contract cannot become effective until the College obtains from the New Jersey Department of Labor a determination of the prevailing wage rates applicable to the Project as of the Contract award date and attaches a copy to the Contract. As required by N.J.S.A. 34:11-56.27, the Contractor or any

Subcontractor may be terminated if any covered worker is not paid prevailing wages on the Project, and the Contractor and its surety shall be liable for any additional costs which result.The Contractor and its Subcontractors must be registered with the New Jersey Department of Labor (N.J.S.A. 34:11-56.51 et seq.), and the prevailing wage rates must be posted at the job site (N.J.S.A. 34:11-56.32). The Contractor and its Subcontractors must prepare accurate certified records of wages paid for each worker on the Project (N.J.S.A. 34:11-56.29), and copies for the period covered by each invoice must be attached to the invoice submitted under the Contract. In accordance with N.J.S.A. 34:11-56.33, the Contractor's final invoice must include a statement of all amounts still then due to workers on the Project. The Contractor is also cautioned that it must use job titles and worker classifications consistent with those approved by the Department of Labor, and that, if it intends to pay apprentice rates, it must comply with the Department of Labor's regulations at N.J.A.C. 12:60-7.1 through 7.4.

If the State's Prevailing Wage Act is amended, or the language stated herein is inconsistent with the language contained in the State's Prevailing Wage Act, the language of the State's Prevailing Wage Act shall control.

18.2 Employment Discrimination.

The Contractor and any Subcontractors employed by it shall comply with N.J.S.A. 10:2-1 through 10:2-4 and N.J.S.A. 10:5-1 et seq., including N.J.S.A. 10:5-31 through 10:5-35, which prohibit discrimination in employment in public contracts. The statute and the rules and regulations promulgated thereunder shall be considered to be part of the Contract and binding upon the Contractor and its Subcontractors. If the College is notified of any violation of the public contract awarding regulations in accordance with N.J.A.C. 17:27-7.4 concerning thefinancing of minority and women outreach and training programs, the College reserves the rightsto deduct the outreach and training allocation from the Contract. During the performance of the Contract, the Contractor agrees that:

(a) In the hiring of persons for the performance of Work under the Contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under the Contract, neither the Contractor, its Subcontractors nor any person acting on behalf of the Contractor or any of its Subcontractors, shall, by reason of race, creed, religion, color, national origin, nationality, ancestry, age, sex (including pregnancy), familial status, marital status, domestic partnership or civil union status, affectional or sexual orientation, gender identity or expression, atypical hereditary cellular or blood trait, genetic information, liability for military service, and mental or physical disability, perceived disability, and AIDS and HIV status, discriminate against any person who is qualified and available to perform the Work to which the employment relates;

(b) Neither the Contractor, its Subcontractors, nor any person acting on behalf of the Contractor or any of its Subcontractors shall, in any manner, discriminate against or intimidate any employee engaged in the performance of Work under the Contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any

such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, religion, color, national origin, nationality, ancestry, age, sex (including pregnancy), familial status, marital status, domestic partnership or civil union status, affectional or sexual orientation, gender identity or expression, atypical hereditary cellular or blood trait, genetic information, liability for military service, and mental or physical disability, perceived disability, and AIDS and HIV status;

(c) There may be deducted from the amount payable to the Contractor by the College, under the Contract, a penalty of $50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the Contract; and

(d) The Contract may be canceled or terminated by the College, and allmoney due or to become due hereunder may be forfeited, for any violationof this Article of the Contract occurring after notice to the Contractor fromthe College of any prior violation of this Article of the Contract. The Contractor and its Subcontractors shall comply with all laws prohibiting discrimination against employees, and shall comply with the provision in the Contract regarding employment discrimination.

If the State's Law Against Discrimination is amended, or the language stated herein is inconsistent with the language contained in the State's Law Against Discrimination, the languageof the State's Law Against Discrimination shall control.

18.3 Patents.

If any design, device, material or process covered by patents or copyright is used in the Work, the Contractor shall provide for such use by a suitable agreement with the patent or copyright owner. The Contractor shall bear all costs arising from the use of patented materials, equipment, or processes and all copyrighted materials used on or incorporated in the Work. The Contractor shall defend, indemnify and hold harmless the College and its representatives from any and all claims for infringement by reason of the use of any such patented or copyrighted items.

18.4 The Contractor's Compliance With Law.

The Contractor shall keep fully informed of all federal, state and local laws, ordinances, regulations and orders of agencies that have jurisdiction or authority that in any manner affect those employed on the Project or the Project. The Contractor shall at all times observe and comply with, and cause its agents and employees to observe and comply with, all such laws, ordinances, regulations, and/or orders. The Contractor shall also protect and indemnify, defend and hold harmless the College and its representatives against any claim or liability arising from the violation of any laws, ordinances, regulations, or orders, whether by the Contractor or its employees, agents, Subcontractors at any tier, suppliers or materialmen.

18.5 Environmental Protection – The Contractor's Duty To Comply With Applicable Law.

The Contractor shall comply with all applicable federal, state and local laws and regulations and all conditions of permits pertaining to the protection of the environment. Necessary precautions shall be taken to prevent pollution of streams, lakes, ponds, rivers, wetlands, groundwater, reservoirs, and property by chemicals, fuels, oils, bitumens, or other harmful or hazardous materials as defined by law. The Contractor also shall not pollute the atmosphere from particulate or gaseous matter in violation of applicable law.

18.6 No Personal Liability Of College Officials.

In carrying out any of the provisions of the Contract, or in exercising any right or authority granted to them by or in connection with the Contract, there shall be no liability upon any trustee, officer or employee of the College, either personally or as officials of the College, it being agreed that in all such functions they act only as agents and representatives of the College.

18.7 Recovery Of Monies By The College From Other Contracts With The Contractor.

When the Contract Documents authorize the College to withhold or deduct money from any monies due to the Contractor, or require the Contractor to pay or return monies for any reason, the College may in its discretion withhold any monies due the Contractor under any othercontracts between the Contractor and the College. This right shall not affect the rights of the College against the Contractor or its surety under the Contract, and the College shall not be obliged to exercise this right as to any other contract as a condition of exercising its rightsagainst the Contractor or surety under the Contract.

18.8 Buy American Requirement.

The Contractor shall comply with N.J.S.A. 52:32-1 and N.J.S.A. 52:33-1 et seq., which prohibit the use by the Contractor or Subcontractors of materials or farm products produced and manufactured outside of the United States on any public Work. Notwithstanding any inconsistent provision of any law, and unless the head of the department, or other public officer charged with the duty by law, shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, only domestic materials shall be acquired or used for any public work. This Article shall not apply with respect to domestic materials to be used for any public work, if domestic materials of the class or kind to be used are not mined, produced or manufactured, as the case may be, in the United States in commercial quantities and of a satisfactory quality. If the State's "Buy American" laws are amended, or the language stated herein is inconsistent with the language contained in the State's "Buy American" laws, the language of the State's "Buy American" laws shall control.

18.9 Compliance With Grant Requirements. The Contractor acknowledges and agrees that if the College receives any grant monies in connection with the Project, the Contractor and its Subcontractors shall comply with all requirements associated with such grant or set forth in such grant agreement.

18.10 Modification Of Contract.

No modification or amendment of the Contract shall be effective unless it is in writing and signed by both the College and the Contractor.

18.11 State Sales Tax Exemption.

Materials, supplies or services for exclusive use in constructing the Project are exempt from the State Sales Tax Act. Rentals of equipment are not exempt from any tax under the State Sales Tax Act.

18.12 Successors and Assigns.

The College and the Contractor respectively bind themselves, their successors and assigns, to the other party hereto and to the successors and assigns of such other party in respect to covenants, agreements and obligations contained in the Contract Documents.

The Contractor shall not assign the Contract, nor shall the Contractor transfer or assign any Contract funds, due or to become due, or claims of any nature it has against the College without the prior written approval of the College. The College in its sole discretion and considering primarily the interests of the College may elect either to grant or to deny such approval. If the Contractor attempts to make such an assignment without the College's prior written approval, the Contractor shall nevertheless remain legally responsible for all obligations under the Contract.

The College shall be entitled to assign its rights hereunder to one or more lenders as collateral for loans which the College may obtain to finance construction of the Project and to a party who presently has or later acquires a legal interest in the premises. The Contractor agrees to execute such certificates, documents and instruments as are reasonably requested by the College, including, without limitation, certificates, documents and instruments that evidence the Contractor's consent to an assignment of the Contract or confirm the absence or existence of a default on the part of the College hereunder.

18.13 Construction Liens.

If any Subcontractor or other person working under the Contractor files a construction lien or claim or notice of intention or right to file a lien for or on account of Work, labor, services, materials, equipment or other items furnished under or in connection with the Contract for which the College has paid the Contractor, the Contractor agrees to discharge or remove such lien, claim or notice at its own expense by bond, payment or otherwise within twenty (20) calendar days from the date of the filing thereof, and upon its failure to do so, the College shall have the right to cause any such lien or claim, notice of intention or stop notice to be removed or discharged by whatever means the College chooses, at the sole cost and expense of the

Contractor (such costs and expenses to include legal fees and disbursements). The Contractor agrees to indemnify, defend and hold harmless the College and its representatives from and against any and all such liens, claims or other filings, and actions brought or judgments rendered thereon, and from and against any and all losses, damages, liabilities, costs and expenses,including legal fees and disbursements, which the College may sustain in connection therewith. Further, if any Subcontractor or other person working under the Contractor files a construction lien or claim or notice of intention or right to file a lien for or on account of Work, labor,services, materials, equipment or other items furnished under or in connection with the Contract for which the College has paid the Contractor, the College may, in the College's sole discretion, pay all wages, damages, recoveries, costs and expenses and reasonable counsel fees arising therefrom and deduct the same from any monies due or to become due to the Contractor.

18.14 Independent Contractor Status.

The relationship of the Contractor to the College is that of an independent contractor. The Contractor agrees that it shall conduct itself consistent with such status, and shall not hold itself out as or claim to be a trustee, officer, employee or agent of the College. The Contractor shall not make any claim or demand for any right or privilege applicable to officers or employeesof the College, including but not limited to, workers compensation, unemployment insurance benefits, social security coverage, or retirement benefits.

18.15 Third Party Beneficiary Rights Not Intended.

It is specifically agreed between the College and the Contractor that no provisions of the Contract Documents are intended to make the public or any member thereof a third party beneficiary of the Contract, or to authorize anyone not a party to the Contract to maintain a suit for personal injuries, property damage or other claims under the Contract. It is also the intent of the College and the Contractor that no individual or firm that supplies materials, labor, services, or equipment to the Contractor for the performance of the Work shall be a third party beneficiary of the Contract.

18.16 Gifts To College Employees And Agents Prohibited.

The Contractor shall not give any gifts of any nature, nor any gratuity in any form, nor loan any money or anything of value to any College employee or relative thereof, or any agent ofthe College. The Contractor shall not rent or purchase any equipment or supplies of any kind from any College employee or relative thereof or any agent of the College.

18.17 Compliance With Procurement Statutes.

The Contractor warrants and represents that the Contract has not been solicited or secured, directly or indirectly, in a manner contrary to the law of New Jersey, and in particularthe provisions of N.J.S.A. 18A:64-6.1, 6.2 and 6.3, and that the Contractor has not and shall not violate the law of New Jersey relating to the procurement of or the performance of the Contract by any conduct, including the paying of any gratuity of any kind, directly or indirectly, to any College trustee, employee or officer. Any violation of this Article shall be cause for the College to terminate the Contract, to retain all unpaid and/or unearned monies, and to recover all monies paid. The Contractor shall notify the College in writing of any interest which any trustee, officer,

employee or consultant of the College has in, or association with the Contractor, any other contractor, any Subcontractor, material supplier, consultant, or manufacturer, or other party which has any interest in the Project.

18.18 Conflict Of Interest.

The Contractor shall not pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to anyState officer or employee or special State officer or employee, as defined by N.J.S.A. 52:13D- 13b. and e., in the Department of the Treasury or any other agency with which the Contractor transacts or offers or proposes to transact business, or to any member of the immediate family, asdefined by N.J.S.A. 52:13D-13i., of any such officer or employee, or any partnership, firm, or corporation with which they are employed or associated, or in which such officer or employeehas an interest within the meaning of N.J.S.A. 52:13D-13g.

The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any State officer or employee or special State officer or employee from any Statevendor shall be reported in writing forthwith by the Contractor to the Attorney General and the Executive Commission on Ethical Standards.

The Contractor may not, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in the Contractor to, anyState officer or employee or special State officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or servicesby or to any State agency or any instrumentality thereof, or with any person, firm or entity with which he is employed or associated or in which he has an interest within the meaning of N.J.S.A.52:13D-13g. Any relationships subject to this Article shall be reported in writing forthwith to theExecutive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the State officer or employee or special State officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance ofa conflict of interest.

The Contractor shall not influence, or attempt to influence or cause to be influenced, any State officer or employee or special State officer or employee in his official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.

The Contractor shall not cause or influence, or attempt to cause or influence, any State officer or employee or special State officer or employee to use, or attempt to use, his official position to secure unwarranted privileges or advantages for the Contractor or any other person.

The provisions cited above shall not be construed to prohibit a State officer or employee or special State officer or employee from receiving gifts from or contracting with the Contractor under the same terms and conditions as are offered or made available to members of the general public subject to any guidelines the Executive Commission on Ethical Standards may promulgate.

The Contractor shall require its Subcontractors and suppliers to comply with the requirements of this Article.

18.19 Confidential Information.

The Contractor shall maintain the confidentiality of information specifically designated as confidential by the College, unless withholding such information would violate applicable law. The Contractor shall require its Subcontractors to maintain the confidentiality of information specifically designated as confidential by the College.

18.20 Publicity.

Publicity and/or public announcements pertaining to the Project must be approved in writing by the College prior to release.