



Heat Recovery Steam Generator (HRSG) Replacement Project

TCNJ Advertised Bid # AB190035

PROJECT REQUIREMENTS

SCOPE OF WORK

DRAWINGS

June 3, 2019



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 **June 2, 2019**. Contact person regarding placement of ad is Roselle Horodeski (609) 771-2894.

**THE COLLEGE OF NEW JERSEY
ADVERTISEMENT FOR BIDS
BID #AB190035**

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 **Heat Recovery Steam Generator (HRSG) Replacement Project** until **2:00 P.M. on the 27th day of June, 2019** 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 **June 3, 2019** via our website (www.tcnj.edu/~budfin/).

A **strongly encouraged pre-bid conference/on-site inspection** is scheduled on **June 6, 2019 at 10:00 A.M.** in Room 103 of the Administrative Services Building, located on The College's Ewing Township, New Jersey campus on Route 31 (Pennington Road).

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 Stockholders Exceeding 10%"; 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

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 any or all bids or to waive any 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.



Heat Recovery Steam Generator (HRSG) Replacement Project

Milestone Schedule

Date: 6/3/19

Advertise for bidding	June 3, 2019
Pre-bid/Site visit (ASB103)	June 6, 2019
Cut off for questions	June 13, 2019
Addendum Issued (if needed)	June 19, 2019
Bids Received	June 27, 2019
Notice of Intent to Award issued	July 1, 2019
End of Protest Period	July 15, 2019
Notice to proceed issued by	July 22, 2019
Submittals to Engineer Including Project Schedule & SOV	August 9, 2019
* All equipment ordered by	September 6, 2019
Construction in field start date	April 15, 2020
Substantial Completion/Systems running & tested 100%	August 15, 2020
Final Completion (contract closed out by)	October 15, 2020

*** Contractor is to take delivery of all equipment and store equipment, ready for immediate installation once work starts in the field.**

**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: AB190035
Bid Due Date: June 27, 2019

Project Name: Heat Recovery Steam Generator (HRSG) Replacement

BIDDER INFORMATION

Firm Name:

Telephone Number:

Contact Person:

Fax Number:

Address:

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, bidder lists the names of the subcontractors on the Subcontractor Information page.
2. The scope of work includes the replacement of the existing HRSG within the cogeneration plant. Additional work associated with this project includes roof replacement, new economizer, new exhaust breeching and associated piping and controls work.
 - 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 base 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 of Notice of Intent to Award, except for the successful bidder(s) whose bid security shall be returned after execution of a formal contract, and delivery of the Performance Bond/Labor and Material Bond and Certificates of Insurance.
- 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 Statement of Ownership Disclosure form and the Non-Collusion Affidavit form.

~~7. Bidders are required to be registered with the New Jersey Department of Property Management and Construction (DPMC) and possess a DPMC C008 classification at the time of bid submission.~~

8. 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 56.57. 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, 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. 12:60-7.1 through 7.4.
- Please refer to http://lwd.dol.state.nj.us/labor/wagehour/wagerate/wage_rates.html for official wage rate determinations for Mercer County, NJ.

9. 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**

10. 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.**
11. 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.

- 12. 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.
- 13. 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.

14. 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 fax to **609-637-5140** or email to **horodesk@tcnj.edu** and must be received **prior to 4:00 p.m., on June 13, 2019.**
- B. Should any questions be received, an addendum or clarification will be available on or after **June 19, 2019.** **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.**

15. 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., June 27, 2019,** to The College of New Jersey, Attention: Roselle Horodeski 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.
- 16.** 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 to allow the College to determine the lowest bid that will most economically serve the intentions of this Contract.
- 17.** 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 its best interest.
- 18.** Bids shall include all costs of any nature necessary to complete the project in the manner and within the time required by the contract.
- 19.** The College reserves the right to require bidders to provide a schedule of values of their lump sum bid price upon request.

20. 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.
21. 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.
22. 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.
23. It is understood and agreed that all prices quoted are firm and not subject to any increase during the life of the contract.
24. 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.
25. 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.

26. ACCEPTANCE/REJECTION OF BIDS

- A. THE COLLEGE OF NEW JERSEY, pursuant to State College Contract Law reserves the right to accept or reject any or all items covered in the bid request, or any portion(s) thereof, re-advertise and/or take such other steps decreed necessary and in the best interest of the College in accordance with law. Where two or more bidders are tied and all other relevant factors being equal, the College reserves the right to make the award to one of the bidders.
- 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.

27. 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.

28. 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.

29. 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

30. 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.

31. 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.

32. 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.

33. 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.

34. 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.

35. 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.
- **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 insure 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 Affidavit.
- 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)
- g. _____ Bidder has acknowledged the **Affirmative Action Language** in accordance with the requirements P.L. 1975 C.127. (NJAC 17:27).
- 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.**

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.

(Seal if bid is by Corporation)

Respectfully submitted,

(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: Heat Recovery Steam Generator (HRSG) Replacement

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. Alternates:

Alternate No. 1 – Not Used.

Alternate No. 2 – Add:

Replacement of existing deaerator (DA-1) located within Cogeneration Plant with new 100,000 PPH deaerator (DA-3) and associated boiler feedwater pumps. (Refer to Drawings and Specifications for additional details).

_____ Dollars \$ _____
(words)

Alternate No. 3 – Add:

Replacement of (3) existing exhaust fans located on the roof of the Cogeneration Plant with (4) new, larger exhaust fans to improve ventilation and maintain lower max. space temperature. (Refer to Drawings and Specifications for additional details).

_____ Dollars \$ _____
(words)

Alternate No. 4 – Add:

Replacement of existing boiler fuel oil pump skid located below Cogeneration Plant Control Room with new pump skid and fuel oil filtration unit capable of filtering both boiler and cogeneration tanks, as well as, transferring fuel from one tank to another. (Refer to Drawings and Specifications for additional details).

_____ Dollars\$
(words)

Alternate No. 5 – Not used.

Note: Failure to provide Add/Deduct Alternate may result in rejection of bid.

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: We, the Undersigned, agree, if awarded the Contract to perform additional work or delete work at the Unit Prices set forth below or at a negotiated unit price (Unit Prices are for work that is in addition to or is deleted from the base bid work):

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

Witness

BY: _____

Witness as to Surety

BY: _____
ATTORNEY-IN-FACT

Countersigned

NOTE: General Power of Attorney and the current

this _____ day of _____, 20 _____

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

BY: _____

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)

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L. 1975, C. 127)
N.J.A.C. 17:27

CONSTRUCTION CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, up-grading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer, pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

When hiring or scheduling workers in each construction trade, the contractor or subcontractor agrees to make good faith efforts to employ minority and women workers in each construction trade consistent with the targeted employment goal prescribed by N.J.A.C. 17:27-7.2; provided, however, that the Dept. of LWD, Construction EEO Monitoring Program may, in its discretion, exempt a contractor or subcontractor from compliance with the good faith procedures prescribed by the following provisions, A, B and C, as long as the Dept. of LWD, Construction EEO Monitoring Program is satisfied that the contractor or subcontractor is employing workers provided by a union which provides evidence, in accordance with standards prescribed by the Dept. of LWD, Construction EEO Monitoring Program, that its percentage of active "card carrying" members who are minority and women workers is equal to or greater than the targeted employment goal established in accordance with N.J.A.C. 17:27-7.2. The contractor or subcontractor agrees that a good faith effort shall include compliance with the following procedures:

(A) If the contractor or subcontractor has a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor shall, within three business days of the contract award, seek assurances from the union that it will cooperate with the contractor or subcontractor as it fulfills its affirmative action obligations under this contract and in accordance with the rules promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et. seq., as supplemented and amended from time to time and the Americans with Disabilities Act. If the contractor or subcontractor is unable to obtain said assurances from the construction trade union at least five business days prior to the commencement of construction work, the contractor or subcontractor agrees to afford equal employment opportunities minority and women workers directly, consistent with this chapter. If the contractor's or subcontractor's prior experience with a construction trade union, regardless of whether the union has provided said assurances, indicates a significant possibility that the trade union will not refer sufficient minority and women workers consistent with affording equal employment opportunities as specified in this chapter, the contractor or subcontractor agrees to be prepared to provide such opportunities to minority and women workers directly, consistent with this chapter, by complying with the hiring or scheduling procedures prescribed under (B) below; and the contractor or subcontractor further agrees to take said action immediately if it determines that the union is not referring minority and women workers consistent with the equal employment opportunity goals set forth in this chapter.

(B) If good faith efforts to meet targeted employment goals have not or cannot be met for each construction trade by adhering to the procedures of (A) above, or if the contractor does not have a referral agreement or arrangement with a union for a construction trade, the contractor or subcontractor agrees to take the following actions:

(1) To notify the public agency compliance officer, the Dept. of LWD, Construction EEO Monitoring Program, and minority and women referral organizations listed by the Division pursuant to N.J.A.C. 17:27-5.3, of its workforce needs, and request referral of minority and women workers;

(2) To notify any minority and women workers who have been listed with it as awaiting available vacancies;

(3) Prior to commencement of work, to request that the local construction trade union refer minority and women workers to fill job openings, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade;

(4) To leave standing requests for additional referral to minority and women workers with the local construction trade union, provided the contractor or subcontractor has a referral agreement or arrangement with a union for the construction trade, the State Training and Employment Service and other approved referral sources in the area;

(5) If it is necessary to lay off some of the workers in a given trade on the construction site, layoffs shall be conducted in compliance with the equal employment opportunity and non-discrimination standards set forth in this regulation, as well as with applicable Federal and State court decisions;

(6) To adhere to the following procedure when minority and women workers apply or are referred to the contractor or subcontractor:

(i) The contractor or subcontractor shall interview the referred minority or women worker.

(ii) If said individuals have never previously received any document or certification signifying a level of qualification lower than that required in order to perform the work of the construction trade, the contractor or subcontractor shall in good faith determine the qualifications of such individuals. The contractor or subcontractor shall hire or schedule those individuals who satisfy appropriate qualification standards in conformity with the equal employment opportunity and non-discrimination principles set forth in this chapter. However, a contractor or subcontractor shall determine that the individual at least possesses the requisite skills, and experience recognized by a union, apprentice program or a referral agency, provided the referral agency is acceptable to the Dept. of LWD, Construction EEO Monitoring Program. If necessary, the contractor or subcontractor shall hire or schedule minority and women workers who qualify as trainees pursuant to these rules. All of the requirements, however, are limited by the provisions of (C) below.

(iii) The name of any interested women or minority individual shall be maintained on a waiting list, and shall be considered for employment as described in (i) above, whenever vacancies occur. At the request of the Dept. of LWD, Construction EEO Monitoring Program, the contractor or subcontractor shall provide evidence of its good faith efforts to employ women and minorities from the list to fill vacancies.

(iv) If, for any reason, said contractor or subcontractor determines that a minority individual or a woman is not qualified or if the individual qualifies as an advanced trainee or apprentice, the contractor or subcontractor shall inform the individual in writing of the reasons for the determination, maintain a copy of the determination in its files, and send a copy to the public agency compliance officer and to the Dept. of LWD, Construction EEO Monitoring Program.

(7) To keep a complete and accurate record of all requests made for the referral of workers in any trade covered by the contract, on forms made available by the Dept. of LWD, Construction EEO Monitoring Program and submitted promptly to the Dept. of LWD, Construction EEO Monitoring Program upon request.

(C) The contractor or subcontractor agrees that nothing contained in (B) above shall preclude the contractor or subcontractor from complying with the union hiring hall or apprenticeship policies in any applicable collective bargaining agreement or union hiring hall arrangement, and, where required by custom or agreement, it shall send journeymen and trainees to the union for referral, or to the apprenticeship program for admission, pursuant to such agreement or arrangement. However, where the practices of a union or apprenticeship program will result in the exclusion of minorities and women or the failure to refer minorities and women consistent with the targeted county employment goal, the contractor or subcontractor shall consider for employment persons referred pursuant to (B) above without regard to such agreement or arrangement; provided further, however, that the contractor or subcontractor shall not be required to employ women and minority advanced trainees and trainees in numbers which result in the employment of advanced trainees and trainees as a percentage of the total workforce for the construction trade, which percentage significantly exceeds the apprentice to journey worker ratio specified in the applicable collective bargaining agreement, or in the absence of a collective bargaining agreement, exceeds the ratio established by practice in the area for said construction trade. Also, the contractor or subcontractor agrees that, in implementing the procedures of (B) above, it shall, where applicable, employ minority and women workers residing within the geographical jurisdiction of the union.

After notification of award, but prior to signing a construction contract, the contractor shall submit to the public agency compliance officer and the Dept. of LWD, Construction EEO Monitoring Program an initial project workforce report (Form AA 201) electronically provided to the public agency by the Dept. of LWD, Construction EEO Monitoring Program, through its website, for distribution to and completion by the contractor, in accordance with N.J.A.C. 17:27-7. The contractor also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to the Division and to the public agency compliance officer.

The contractor agrees to cooperate with the public agency in the payment of budgeted funds, as is necessary, for on-the-job and/or off-the-job programs for outreach and training of minorities and women.

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code (NJAC 17:27)**.

IF AWARDED A CONTRACT YOUR COMPANY/FIRM WILL BE REQUIRED TO COMPLY WITH THE AFFIRMATIVE ACTION REQUIREMENTS LISTED ABOVE.

Firm Name: _____

Signature: _____

Title: _____

Date: _____

Additional Mandatory Construction Contract Language For State Agencies, Independent Authorities, Colleges and Universities Only

The Executive Order No. 151 (Corzine, August 28, 2009) and P.L. 2009, Chapter 335 include a provision which require all state agencies, independent authorities and colleges and universities to include additional mandatory equal employment and affirmative action language in its construction contracts. It is important to note that this language is in addition to and does not replace the mandatory contract language and good faith efforts requirements for construction contracts required by N.J.A.C. 17:27-3.6, 3.7 and 3.8. The additional mandatory equal employment and affirmative action language is as follows:

It is the policy of the **[Reporting Agency]** that its contracts should create a workforce that reflects the diversity of the State of New Jersey. Therefore, contractors engaged by the **[Reporting Agency]** to perform under a construction contract shall put forth a good faith effort to engage in recruitment and employment practices that further the goal of fostering equal opportunities to minorities and women.

The contractor must demonstrate to the **[Reporting Agency]**'s satisfaction that a good faith effort was made to ensure that minorities and women have been afforded equal opportunity to gain employment under the **[Reporting Agency]**'s contract with the contractor. Payment may be withheld from a contractor's contract for failure to comply with these provisions.

Evidence of a "good faith effort" includes, but is not limited to:

1. The Contractor shall recruit prospective employees through the State Job bank website, managed by the Department of Labor and Workforce Development, available online at <http://NJ.gov/JobCentralNJ>;
2. The Contractor shall keep specific records of its efforts, including records of all individuals interviewed and hired, including the specific numbers of minorities and women;
3. The Contractor shall actively solicit and shall provide the **[Reporting Agency]** with proof of solicitations for employment, including but not limited to advertisements in general circulation media, professional service publications and electronic media; and
4. The Contractor shall provide evidence of efforts described at 2 above to the **[Reporting Agency]** no less frequently than once every 12 months.
5. The Contractor shall comply with the requirements set forth at N.J.A.C. 17:27.

To ensure successful implementation of the Executive Order and Law, state agencies, independent authorities and colleges and universities must forward an Initial Project Workforce Report (AA 201) for any projects funded with ARRA money to the Dept. of LWD, Construction EEO Monitoring Program immediately upon notification of award but prior to execution of the contract.



STATEMENT OF OWNERSHIP DISCLOSURE

N.J.S.A. 52:25-24.2 (P.L. 1977, c.33, as amended by P.L. 2016, c.43)

This statement shall be completed, certified to, and included with all bid and proposal submissions. Failure to submit the required information is cause for automatic rejection of the bid or proposal.

Name of Organization: _____

Organization Address: _____

Part I Check the box that represents the type of business organization:

- Sole Proprietorship (skip Parts II and III, execute certification in Part IV)
- Non-Profit Corporation (skip Parts II and III, execute certification in Part IV)
- For-Profit Corporation (any type) Limited Liability Company (LLC)
- Partnership Limited Partnership Limited Liability Partnership (LLP)
- Other (be specific): _____

Part II

The list below contains the names and addresses of all stockholders in the corporation who own 10 percent or more of its stock, of any class, or of all individual partners in the partnership who own a 10 percent or greater interest therein, or of all members in the limited liability company who own a 10 percent or greater interest therein, as the case may be. **(COMPLETE THE LIST BELOW IN THIS SECTION)**

OR

No one stockholder in the corporation owns 10 percent or more of its stock, of any class, or no individual partner in the partnership owns a 10 percent or greater interest therein, or no member in the limited liability company owns a 10 percent or greater interest therein, as the case may be. **(SKIP TO PART IV)**

(Please attach additional sheets if more space is needed):

Name of Individual or Business Entity	Home Address (for Individuals) or Business Address

--	--

Part III DISCLOSURE OF 10% OR GREATER OWNERSHIP IN THE STOCKHOLDERS, PARTNERS OR LLC MEMBERS LISTED IN PART II

If a bidder has a direct or indirect parent entity which is publicly traded, and any person holds a 10 percent or greater beneficial interest in the publicly traded parent entity as of the last annual federal Security and Exchange Commission (SEC) or foreign equivalent filing, ownership disclosure can be met by providing links to the website(s) containing the last annual filing(s) with the federal Securities and Exchange Commission (or foreign equivalent) that contain the name and address of each person holding a 10% or greater beneficial interest in the publicly traded parent entity, along with the relevant page numbers of the filing(s) that contain the information on each such person. **Attach additional sheets if more space is needed.**

Website (URL) containing the last annual SEC (or foreign equivalent) filing	Page #'s

Please list the names and addresses of each stockholder, partner or member owning a 10 percent or greater interest in any corresponding corporation, partnership and/or limited liability company (LLC) listed in Part II **other than for any publicly traded parent entities referenced above.** The disclosure shall be continued until names and addresses of every noncorporate stockholder, and individual partner, and member exceeding the 10 percent ownership criteria established pursuant to N.J.S.A. 52:25-24.2 has been listed. **Attach additional sheets if more space is needed.**

Stockholder/Partner/Member and Corresponding Entity Listed in Part II	Home Address (for Individuals) or Business Address

Part IV Certification

I, being duly sworn upon my oath, hereby represent that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I acknowledge: that I am authorized to execute this certification on behalf of the bidder/proposer; that the **The College of New Jersey** is relying on the information contained herein and that I am under a continuing obligation from the date of this certification through the completion of any contracts with **The College of New Jersey** to notify the **The College of New Jersey** in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I am subject to criminal prosecution under the law and that it will constitute a material breach of my agreement(s) with the, permitting the **The College of New Jersey** to declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print):		Title:	
Signature:		Date:	



NON-COLLUSION STATEMENT

Date: _____

The College of New Jersey
The Office of Budget and Finance, Department of Purchasing
Administrative Services Building, Room 201
P.O. Box 7718
Ewing, New Jersey 08628-0718

To Whom It May Concern:

This is to certify that the undersigned bidder _____ as not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the proposal submitted to The College of New Jersey on the _____ day of _____, 20_____.

Signature: _____

Corporate Seal:

Attest by: _____

Sworn to and subscribed before me this _____ day of _____, 20_____.

My commission Expires: _____

Notary Public

THIS STATEMENT MUST BE COMPLETED AND SIGNED

INFORMATION AND INSTRUCTIONS

For Completing the “Two-Year Vendor Certification and Disclosure of Political Contributions” Form

Background Information

On September 22, 2004, then-Governor James E. McGreevey issued E.O. 134, the purpose of which was to insulate the negotiation and award of State contracts from political contributions that posed a risk of improper influence, purchase of access or the appearance thereof. To this end, E.O. 134 prohibited State departments, agencies and authorities from entering into contracts exceeding \$17,500 with individuals or entities that made certain political contributions. E.O. 134 was superseded by Public Law 2005, c. 51, signed into law on March 22, 2005 (“Chapter 51”).

On September 24, 2008, Governor Jon S. Corzine issued E.O. 117 which is designed to enhance New Jersey's efforts to protect the integrity of procurement decisions and increase the public's confidence in government. The Executive Order builds upon the provisions of Chapter 51.

Two-Year Certification Process

Upon approval by the State Chapter 51 Review Unit, the Certification and Disclosure of Political Contributions form is valid for a two (2) year period. Thus, if a vendor receives approval on January 1, 2014, the certification expiration date would be December 31, 2015. Any change in the vendor's ownership status and/or political contributions during the two-year period will require the submission of new Chapter 51/Executive Order 117 forms to the State Review Unit. **Please note that it is the vendor's responsibility to file new forms with the State should these changes occur.**

State Agency Instructions: Prior to the awarding of a contract, the State Agency should first send an e-mail to CD134@treas.nj.gov to verify the certification status of the vendor. If the response is that the vendor is NOT within an approved two-year period, then forms must be obtained from the vendor and forwarded for review. If the response is that the vendor is within an approved two-year period, then the response so stating should be placed with the bid/contract documentation for the subject project.

Instructions for Completing the Form

NOTE: Please refer to pages 3 and 4 “USEFUL DEFINITIONS for the purposes of Chapter 51 and Executive Order 117” for guidance when completing the form.

Part 1: BUSINESS ENTITY INFORMATION

Business Name – Enter the full legal name of the vendor, including trade name if applicable.

Address, City, State, Zip and Phone Number -- Enter the vendor's street address, city, state, zip code and telephone number.

Vendor Email – Enter the vendor's primary email address.

Vendor FEIN – Please enter the vendor's Federal Employment Identification Number.

Business Type - Check the appropriate box that represents the vendor's type of business formation.

Listing of officers, shareholders, partners or members - Based on the box checked for the business type, provide the corresponding information. (A complete list must be provided.)

Part 2: DISCLOSURE OF CONTRIBUTIONS

Read the three types of political contributions that require disclosure and, if applicable, provide the recipient's information. The definition of "Business Entity/Vendor" and "Contribution" can be found on pages 3 and 4 of this form.

Name of Recipient - Enter the full legal name of the recipient.

Address of Recipient - Enter the recipient's street address.

Date of Contribution - Indicate the date the contribution was given.

Amount of Contribution - Enter the dollar amount of the contribution.

Type of Contribution - Select the type of contribution from the examples given.

Contributor's Name - Enter the full name of the contributor.

Relationship of the Contributor to the Vendor - Indicate the relationship of the contributor to the vendor. (e.g. officer or shareholder of the company, partner, member, parent company of the vendor, subsidiary of the vendor, etc.)

NOTE: If form is being completed electronically, click "Add a Contribution" to enter additional contributions. Otherwise, please attach additional pages as necessary.

Check the box under the recipient information if no reportable contributions have been solicited or made by the business entity. **This box must be checked if there are no contributions to report.**

Part 3: CERTIFICATION

Check Box A if the representative completing the Certification and Disclosure form is doing so on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity. **(No additional Certification and Disclosure forms are required if BOX A is checked.)**

Check Box B if the representative completing the Certification and Disclosure form is doing so on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity with the exception of those individuals and/or entities that submit their own separate form. For example, the representative is not signing on behalf of the vice president of a corporation, but all others. The vice president completes a separate Certification and Disclosure form. **(Additional Certification and Disclosure forms are required from those individuals and/or entities that the representative is not signing on behalf of and are included with the business entity's submittal.)**

Check Box C if the representative completing the Certification and Disclosure form is doing so on behalf of the business entity only. **(Additional Certification and Disclosure forms are required from all individuals and/or entities whose contributions are attributable to the business entity and must be included with the business entity submittal.)**

Check Box D when a sole proprietor is completing the Certification and Disclosure form or when an individual or entity whose contributions are attributable to the business entity is completing a separate Certification and Disclosure form.

Read the five statements of certification prior to signing.

The representative authorized to complete the Certification and Disclosure form must sign and print her/his name, title or position and enter the date.

Public Law 2005, Chapter 51 and Executive Order 117 (2008)

State Agency Procedure for Submitting Form(s)

The State Agency should submit the completed and signed Two-Year Vendor Certification and Disclosure forms either electronically to: cd134@treas.nj.gov or regular mail at: Chapter 51 Review Unit, P.O. Box 230, 33 West State Street, Trenton, NJ 08625-0230. Original forms should remain with the State Agency and copies should be sent to the Chapter 51 Review Unit.

Business Entity Procedure for Submitting Form(s)

The business entity should return this form to the contracting State Agency.

The business entity can submit the Certification and Disclosure form directly to the Chapter 51 Review Unit only when:

- The business entity is approaching its two-year certification expiration date and is seeking certification renewal;
- The business entity had a change in its ownership structure; OR
- The business entity made any contributions during the period in which its last two-year certification was in effect, or during the term of a contract with a State Agency.

Questions & Information

Questions regarding the interpretation or application of Public Law 2005, Chapter 51 (N.J.S.A. 19:44A-20.13) or E.O. 117 (2008) may be submitted electronically through the Division of Purchase and Property website at:

<https://www.state.nj.us/treas/purchase/eo134questions.shtml>

Reference materials and forms are posted on the Political Contributions Compliance website at:

<http://www.state.nj.us/treasury/purchase/execorder134.shtml>

USEFUL DEFINITIONS for the purposes of Chapter 51 and Executive Order 117

- **“Business Entity/Vendor”** means any natural or legal person, business corporation, professional services corporation, limited liability company, partnership, limited partnership, business trust, association or any other legal commercial entity organized under the laws of New Jersey or any other state or foreign jurisdiction. The definition also includes (i) if a business entity is a for-profit corporation, any officer of the corporation and any other person or business entity that owns or controls 10% or more of the stock of the corporation; (ii) if a business entity is a professional corporation, any shareholder or officer; (iii) if a business entity is a general partnership, limited partnership or limited liability partnership, any partner; (iv) if a business entity is a sole proprietorship, the proprietor; (v) if the business entity is any other form of entity organized under the laws of New Jersey or any other state or foreign jurisdiction, any principal, officer or partner thereof; (vi) any subsidiaries directly or indirectly controlled by the business entity; (vii) any political organization organized under 26 U.S.C.A. § 527 that is directly or indirectly controlled by the business entity, other than a candidate committee, election fund, or political party committee; and (viii) with respect to an individual who is included within the definition of “business entity,” that individual's civil union partner and any child residing with that person.¹
- **“Officer”** means a president, vice president with senior management responsibility, secretary, treasurer, chief executive officer or chief financial officer of a corporation or any person routinely performing such functions for a corporation. Please note that officers of non-profit entities are excluded from this definition.
- **“Partner”** means one of two or more natural persons or other entities, including a corporation, who or which are joint owners of and carry on a business for profit, and which business is organized under the laws of this State or any other state or foreign jurisdiction, as a general partnership, limited partnership, limited liability partnership, limited liability company, limited partnership association, or other such form of business organization.

¹Contributions made by a spouse, civil union partner or resident child to a candidate for whom the contributor is eligible to vote or to a political party committee within whose jurisdiction the contributor resides are permitted.

USEFUL DEFINITIONS for the purposes of Chapter 51 and Executive Order 117

- **“Contribution”** is a contribution, including an in-kind contribution, in excess of \$300.00 in the aggregate per election made to or received by a candidate committee, joint candidates committee, or political committee; or per calendar year made to or received by a political party committee, legislative leadership committee, or continuing political committee or a currency contribution in any amount.
- **“In-kind Contribution”** means a contribution of goods or services received by a candidate committee, joint candidates committee, political committee, continuing political committee, political party committee, or legislative leadership committee, which contribution is paid for by a person or entity other than the recipient committee, but does not include services provided without compensation by an individual volunteering a part of or all of his or her time on behalf of a candidate or committee.
- **“Continuing Political Committee”** includes any group of two or more persons acting jointly, or any corporation, partnership, or any other incorporated or unincorporated association, including a political club, political action committee, civic association or other organization, which in any calendar year contributes or expects to contribute at least \$4,300 to aid or promote the candidacy of an individual, or the candidacies of individuals, for elective public office, or the passage or defeat of a public questions, and which may be expected to make contributions toward such aid or promotion or passage or defeat during a subsequent election, provided that the group, corporation, partnership, association or other organization has been determined by the Commission to be a continuing political committee in accordance with N.J.S.A. 19:44A-8(b).
- **“Candidate Committee”** means a committee established by a candidate pursuant to N.J.S.A. 19:44A-9(a), for the purpose of receiving contributions and making expenditures.
- **“State Political Party Committee”** means a committee organized pursuant to N.J.S.A. 19:5-4.
- **“County Political Party Committee”** means a committee organized pursuant to N.J.S.A. 19:5-3.
- **“Municipal Political Party Committee”** means a committee organized pursuant to N.J.S.A. 19:5-2.
- **“Legislative Leadership Committee”** means a committee established, authorized to be established, or designated by the President of the Senate, the Minority Leader of the Senate, the Speaker of the General Assembly, or the Minority Leader of the General Assembly pursuant to N.J.S.A. 19:44A-10.1 for the purpose of receiving contributions and making expenditures.
- **“Political Party Committee”** means:
 1. The State committee of a political party, as organized pursuant to N.J.S.A. 19:5-4;
 2. Any county committee of a political party, as organized pursuant to N.J.S.A. 19:5-3; or
 3. Any municipal committee of a political party, as organized pursuant to N.J.S.A. 19:5-2



State of New Jersey
Department of the Treasury

Division of Purchase and Property
Two-Year Chapter 51/Executive Order 117 Vendor Certification and
Disclosure of Political Contributions

FOR STATE AGENCY USE ONLY

Solicitation, RFP, or Contract No. _____ Award Amount _____

Description of Services _____

State Agency Name _____ Contact Person _____

Phone Number _____ Contact Email _____

Check if the Contract / Agreement is Being Funded Using FHWA Funds

**Please check if requesting
recertification**

Part 1: Business Entity Information

Full Legal Business Name _____
(Including trade name if applicable)

Address _____

City _____ State _____ Zip _____ Phone _____

Vendor Email _____ Vendor FEIN (SS# if sole proprietor/natural person) _____

**Check off the business type and list below the required information for the type of business selected.
MUST BE COMPLETED IN FULL**

- Corporation: LIST ALL OFFICERS and any 10% and greater shareholder
- Professional Corporation: LIST ALL OFFICERS and ALL SHAREHOLDERS
- Partnership: LIST ALL PARTNERS with any equity interest
- Limited Liability Company: LIST ALL MEMBERS with any equity interest
- Sole Proprietor

Note: "Officers" means President, Vice President with senior management responsibility, Secretary, Treasurer, Chief Executive Officer or Chief Financial Officer of a corporation, or any person routinely performing such functions for a corporation.

All Officers of a Corporation or PC

**10% and greater shareholders of a corporation
or all shareholder of a PC**

All Equity partners of a Partnership

All Equity members of a LLC

If you need additional space for listing of Officers, Shareholders, Partners or Members, please attach separate page.

IMPORTANT NOTE: You must review the definition of "contribution" and "business entity" on the Information and Instructions form prior to completing Part 2 and Part 3. The Information and Instructions form is available at: <http://www.state.nj.us/treasury/purchase/forms.shtml#eo134>

Part 2: Disclosure of Contributions by the business entity or any person or entity whose contributions are attributable to the business entity.

1. Report below all contributions solicited or made during the 4 years immediately preceding the commencement of negotiations or submission of a proposal to any:

Political organization organized under Section 527 of the Internal Revenue Code and which also meets the definition of a continuing political committee as defined in N.J.S.A. (See Information and Instructions form.)

2. Report below all contributions solicited or made during the 5 ½ years immediately preceding the commencement of negotiations or submission of a proposal to any:

Candidate Committee for or Election Fund of any Gubernatorial or Lieutenant Gubernatorial candidate
State Political Party Committee
County Political Party Committee

3. Report below all contributions solicited or made during the 18 months immediately preceding the commencement of negotiations or submission of a proposal to any:

Municipal Political Party Committee
Legislative Leadership Committee

Full Legal Name of Recipient _____
Address of Recipient _____
Date of Contribution _____ Amount of Contribution _____
Type of Contribution (i.e. currency, check, loan, in-kind) _____
Contributor Name _____
Relationship of Contributor to the Vendor _____
If this form is not being completed electronically, please attach additional contributions on separate page. Click the "Add a Contribution" tab to enter additional contributions.

Remove Contribution

Add a Contribution

Check this box only if no political contributions have been solicited or made by the business entity or any person or entity whose contributions are attributable to the business entity.

Part 3: Certification

- (A) I am certifying on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity as listed on Page 1 under **Part 1: Vendor Information**.
- (B) I am certifying on behalf of the business entity and all individuals and/or entities whose contributions are attributable to the business entity as listed on Page 1 under **Part 1: Vendor Information**, except for the individuals and/or entities who are submitting separate Certification and Disclosure forms which are included with this submittal.
- (C) I am certifying on behalf of the business entity only; any remaining persons or entities whose contributions are attributable to the business entity (as listed on Page 1) have completed separate Certification and Disclosure forms which are included with this submittal.
- (D) I am certifying as an individual or entity whose contributions are attributable to the business entity.

I hereby certify as follows:

1. I have read the Information and Instructions accompanying this form prior to completing the certification on behalf of the business entity.
2. All reportable contributions made by or attributable to the business entity have been listed above.

3. The business entity has not knowingly solicited or made any contribution of money, pledge of contribution, including in-kind contributions, that would bar the award of a contract to the business entity unless otherwise disclosed above:

- a) Within the 18 months immediately preceding the commencement of negotiations or submission of a proposal for the contract or agreement to:
 - (i) A candidate committee or election fund of any candidate for the public office of Governor or Lieutenant Governor or to a campaign committee or election fund of holder of public office of Governor or Lieutenant Governor; OR
 - (ii) Any State, County or Municipal political party committee; OR
 - (iii) Any Legislative Leadership committee.
- b) During the term of office of the current Governor or Lieutenant Governor to:
 - (i) A candidate committee or election fund of a holder of the public office of Governor or Lieutenant Governor; OR
 - (ii) Any State or County political party committee of the political party that nominated the sitting Governor or Lieutenant Governor in the last gubernatorial election.
- c) Within the 18 months immediately preceding the last day of the sitting Governor or Lieutenant Governor's first term of office to:
 - (i) A candidate committee or election fund of the incumbent Governor or Lieutenant Governor; OR
 - (ii) Any State or County political party committee of the political party that nominated the sitting Governor or Lieutenant Governor in the last gubernatorial election.

4. During the term of the contract/agreement the business entity has a continuing responsibility to report, by submitting a new Certification and Disclosure form, any contribution it solicits or makes to:

- (a) Any candidate committee or election fund of any candidate or holder of the public office of Governor or Lieutenant Governor; OR
- (b) Any State, County or Municipal political party committee; OR
- (c) Any Legislative Leadership committee.

The business entity further acknowledges that contributions solicited or made during the term of the contract/agreement may be determined to be a material breach of the contract/agreement.

5. During the two-year certification period the business entity will report any changes in its ownership structure (including the appointment of an officer within a corporation) by submitting a new Certification and Disclosure form indicating the new owner(s) and reporting said owner(s) contributions.

I certify that the foregoing statements in Parts 1, 2 and 3 are true. I am aware that if any of the statements are willfully false, I may be subject to punishment.

Signed Name _____ Print Name _____

Title/Position _____ Date _____

Procedure for Submitting Form(s)

The contracting State Agency should submit this form to the Chapter 51 Review Unit when it has been required as part of a contracting process. The contracting State Agency should submit a copy of the completed and signed form(s), to the Chapter 51 Unit and retain the original for their records.

The business entity should return this form to the contracting State Agency. The business entity can submit this form directly to the Chapter 51 Review Unit only when it -

- Is approaching its two-year certification expiration date and wishes to renew certification;
- Had a change in its ownership structure; OR
- Made any contributions during the period in which its last two-year certification was in effect, or during the term of a contract with a State Agency.

Forms should be submitted either electronically to: cd134@treas.nj.gov, or regular mail at: Chapter 51 Review Unit, P.O. Box 230, 33 West State Street, Trenton, NJ 08625.

State of New Jersey

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

Solicitation Number: Bidder/Offeror:

Pursuant to Public Law 2012, c. 25, any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must complete the certification below to attest, under penalty of perjury, that the person or entity, or one of the person or entity's parents, subsidiaries, or affiliates, is not identified on a list created and maintained by the Department of the Treasury as a person or entity engaging in investment activities in Iran.

I certify, pursuant to Public Law 2012, c. 25, that the person or entity listed above for which I am authorized to bid/renew:

- is not providing goods or services of \$20,000,000 or more in the energy sector of Iran, including a person or entity that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran, AND
is not a financial institution that extends \$20,000,000 or more in credit to another person or entity, for 45 days or more, if that person or entity will use the credit to provide goods or services in the energy sector in Iran.

In the event that a person or entity is unable to make the above certification because it or one of its parents, subsidiaries, or affiliates has engaged in the above-referenced activities, a detailed, accurate and precise description of the activities must be provided in part 2 below to the Division of Purchase and Property under penalty of perjury. Failure to provide such will result in the proposal being rendered as non-responsive and appropriate penalties, fines and/or sanctions will be assessed as provided by law.

PART 2: PLEASE PROVIDE FURTHER INFORMATION RELATED TO INVESTMENT ACTIVITIES IN IRAN You must provide a detailed, accurate and precise description of the activities of the bidding person/entity, or one of its parents, subsidiaries or affiliates, engaging in the investment activities in Iran outlined above by completing the boxes below.

EACH BOX WILL PROMPT YOU TO PROVIDE INFORMATION RELATIVE TO THE ABOVE QUESTIONS. PLEASE PROVIDE THOROUGH ANSWERS TO EACH QUESTION. IF YOU NEED TO MAKE ADDITIONAL ENTRIES, PLEASE ADD AN ADDITIONAL SHEET.

Name Relationship to Bidder/Offeror
Description of Activities
Duration of Engagement Anticipated Cessation Date
Bidder/Offeror Contact Name Contact Phone Number

Certification: I, being duly sworn upon my oath, hereby represent and state that the foregoing information and any attachments thereto to the best of my knowledge are true and complete. I attest that I am authorized to execute this certification on behalf of the above-referenced person or entity. I acknowledge that the State of New Jersey is relying on the information contained herein and thereby acknowledge that I am under a continuing obligation from the date of this certification through the completion of any contracts with the State to notify the State in writing of any changes to the answers of information contained herein. I acknowledge that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification, and if I do so, I recognize that I am subject to criminal prosecution under the law and that it will also constitute a material breach of my agreement(s) with the State of New Jersey and that the State at its option may declare any contract(s) resulting from this certification void and unenforceable.

Full Name (Print): Signature:

Title: Date:

MACBRIDE PRINCIPLES FORM

**BIDDER'S REQUIREMENT: TO PROVIDE A CERTIFICATION
IN COMPLIANCE WITH MACBRIDE PRINCIPLES
AND NORTHERN IRELAND ACT OF 1989**

Pursuant to Public Law 1995, c. 134, a responsible bidder selected, after public bidding, by the Director of the Division of Purchase and Property, pursuant to N.J.S.A. 52:34-12, or the Director of the Division of Building and Construction, pursuant to N.J.S.A. 52:32-2, must complete the certification below by checking one of the two representations listed and signing where indicated. If a bidder who would otherwise be awarded a purchase, contract or agreement does not complete the certification, then the Directors may determine, in accordance with applicable law and rules, that it is in the best interest of the State to award the purchase, contract or agreement to another bidder who has completed the certification and has submitted a bid within five (5) percent of the most advantageous bid. If the Directors find contractors to be in violation of the principles which are the subject of this law, they shall take such action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

I certify, pursuant to N.J.S.A. 52:34-12.2 that the entity for which I am authorized to bid:

- has no ongoing business activities in Northern Ireland and does not maintain a physical presence therein through the operation of offices, plants, factories, or similar facilities, either directly or indirectly, through intermediaries, subsidiaries or affiliated companies over which it maintains effective control; or
- will take lawful steps in good faith to conduct any business operations it has in Northern Ireland in accordance with the MacBride principles of nondiscrimination in employment as set forth in N.J.S.A. 52:18A-89.5 and in conformance with the United Kingdom's Fair Employment (Northern Ireland) Act of 1989, and permit independent monitoring of their compliance with those principles.

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

Signature: _____

Print Name: _____

Title: _____

Firm Name: _____

Date: _____



VENDOR QUALIFICATION SHEETS

Vendors are requested to submit evidence of qualifications to meet all requirements as required by the Office of Finance & Business Services at The College of New Jersey by providing the information listed below.

If this information is being requested as part of an RFP or RFQ, vendors may be requested to furnish additional information for clarification purposes. This will in no way change the vendor's original proposal.

TO BE COMPLETED BY VENDOR

1. Please list the types of commodities that your company can provide.

A.

B.

C.

2. The number of years your firm has been providing these services. _____ Year(s)

3. Location of vendor's office that will be responsible for managing contract/service:

Name: _____

Telephone: _____ Fax: _____

Email Address: _____

Street Address: _____

City/State/Zip: _____

Federal Identification Number: _____

4. Address where all purchase orders and payment are to be mailed by users of any contract(s) resulting from this proposal (if different from above).

Purchase Orders:

Firm Name: _____

Street Address: _____

City/State/Zip: _____

Remittances:

Firm Name: _____

Street Address: _____

City/State/Zip: _____

VENDOR QUALIFICATIONS- continued

5. Name of insurance company:

Street Address: _____

City/State/Zip: _____

Types of Insurance: _____

6. Name of individual to contact for sales/services information:

Name: _____

Telephone: _____

Email Address: _____

Street Address: _____

City/State/Zip: _____

7. List the names and titles of personnel who will service this contract:

8. Is your firm registered with the Secretary of State of New Jersey? **Yes** ____ **No** ____

9. Is your firm incorporated? **Yes** ____ **No** ____

A) In What State? _____

10. Is your firm considered a small business in the State of New Jersey? **If yes, please attach a certificate or certification statement from the New Jersey Commerce and Economic Growth Commission.** If no and you would like to register, please contact the New Jersey Commerce and Economic Growth Commission at 609-777-0885.

Small Business: **Yes** ____ **No** ____

A) What category does your firm fall under?

Gross Revenues do not exceed \$500,000 _____

Gross Revenues do not exceed \$5 million _____

Gross Revenues do not exceed \$12 million _____

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

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

TCNJ is required to solicit the foregoing information. Your response, however, is **strictly voluntary**. Please be advised that any contracting decisions made by TCNJ 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 New Jersey owned 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 we do business.

VENDOR QUALIFICATIONS-

11. Please provide a list of former or present clients. Also, indicate the name of a contact person and telephone number for reference purposes. **Any personnel from The College of New Jersey listed as a reference will not be considered a valid reference.**

A. Client Name:

Contact Name:

Telephone Number:

Fax Number:

Email Address:

B. Client Name:

Contact Name:

Telephone Number:

Fax Number:

Email Address:

C. Client Name:

Contact Name:

Telephone Number:

Fax Number:

Email Address:

D. Client Name:

Contact Name:

Telephone Number:

Fax Number:

Email Address:

VENDOR QUALIFICATIONS- continued

12. Please answer the following questions related to your prior experience:

- a. Has the bidder been found, through either court adjudication, arbitration, mediation, or other contractually stipulated alternate dispute resolution mechanism, to have: failed to provide or perform goods or services; or failed to complete the contract in a timely manner; or otherwise performed unsatisfactorily under a prior contract with the contracting unit? If yes, attach summary of details on a separate sheet.

Yes _____

No _____

- b. Has the bidder defaulted on a contract, thereby requiring the local unit to utilize the services of another contractor to provide the goods or perform the services or to correct or complete the contract? If yes, attach summary of details on a separate sheet.

Yes _____

No _____

- c. Has the bidder defaulted on a contract, thereby requiring the local unit to look to the bidder's surety for completion of the contract or tender of the costs of completion? If yes, attach summary of details on a separate sheet.

Yes _____

No _____

- d. Has the bidder been debarred or suspended from contracting with any of the agencies or departments of the executive branch of the State of New Jersey at the time of contract award, whether or not the action was based on experience with the contracting unit. If yes, attach summary of details on a separate sheet.

Yes _____

No _____

Firm Name: _____

Signature: _____

Title: _____

Date: _____



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: [_____] (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:

\$ _____ 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:

<u>Name</u>	<u>Position</u>
_____	<u>Project Executive</u>
_____	<u>Project Manager</u>
_____	<u>Project Superintendent</u>
_____	<u>Project Scheduler</u>

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

By _____
Lloyd Ricketts,
Vice President and Treasurer

Date _____

Date _____

By _____
Vice President for Facilities Management

By _____
Anup Kapur,
Executive Director of Procurement

Date _____

Date _____

CONTRACTOR:

By _____

Title _____

Date _____



GENERAL CONDITIONS
OF THE
CONTRACT FOR CONSTRUCTION

Last Revised January 2019

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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 the Plans 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 result in 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 written decision 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 or materials 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 Contract Documents 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 omissions in 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 which it 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 Site Superintendent.

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. The Contractor shall also comply with any inspection and testing procedures specified in the Contract Documents.

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 to be 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 these General 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 do so.

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 individuals on 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 by the 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 prevented with 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 failure to 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 its approval 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 competent and licensed New Jersey engineer or land surveyor as appropriate to perform all layout Work and to 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 the Architect, 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 on it 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 a professional 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 the Project 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 conditioning system 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 and shall 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 of Work 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 reasonable objection 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 or duties 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 directly against 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 tortious 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 the Contract 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 the Milestone, 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 progress meetings, the Contractor shall provide a look ahead summary and detailed bar charts showing the Work 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 Project Schedule 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 fallen behind the Project Schedule so as to jeopardize the achievement of Milestone, Substantial Completion 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 to the 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 accept in 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 the burden of proof with respect to weather delays shall be upon Contractor. No time extensions will 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 time shown on the Project Schedule shall not be used by the Contractor in a manner that is detrimental to 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 those measures 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 shall perform 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 to each, and suggestions or proposals to reduce or eliminate the delay. This limited time frame is to provide the College the opportunity to immediately address the issue and limit the amount of time 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 responsible under 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 Article shall 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 General Conditions 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 Conditions and 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 to pay 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's submission 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 other documents that the Contractor is required by the Contract Documents to provide to the College at the time of Final Completion. The final invoice must also include a written signed consent to the final 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 responsible because 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 to the 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 and the overpayment to the College, or the College may deduct the cost of the audit and the overpayment 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 paid Subcontractors 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 checks made payable jointly to the Contractor and a Subcontractor; however, by doing so, the College is not undertaking any obligation on the part of the Contractor, nor does the Subcontractor have any claims 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 in the Contract Price because of extensions resulting from changes shall be governed by Article 9 of 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 and suppliers 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 requirements of 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 be completed 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 agrees that 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 Contract Documents 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 in writing and list the incomplete or unsatisfactory items. The Contractor shall immediately complete 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 Subcontractors and 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 additional compensation 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 by the College. When the Contract is terminated, the Contractor shall deliver materials purchased for 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 and shall 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 and equipment 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 from 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 or not 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 the Contractor, 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 for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other 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 after the 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 1088 or later occurrence form of insurance including contractual liability with limits of at least _____ dollars (\$ _____) combined single limit for bodily injury and property damage liability for each occurrence. The CGL policy shall also include products/completed operations with limits of at least (\$ _____) per occurrence. 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 _____ dollars (\$ _____) combined single limit for bodily injury and property damage for each occurrence.

- (c) **Workers Compensation/ Employer's Liability.** Worker's Compensation Insurance applicable to the laws of the State of New Jersey and other State or Federal jurisdictions required to protect the employees of the Contractor and any Subcontractor, sub-subcontractor or supplier who will be engaged in the performance of the Contract. The certificate must so indicate that no proprietor, partner, executive officer or member is excluded. This insurance shall include Employers' Liability Protection with a limit of liability not less than five hundred thousand dollars (\$500,000) bodily injury, each occurrence, five hundred thousand dollars (\$500,000) disease, each employer, and five hundred thousand dollars (\$500,000) 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's 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 the policies 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 by the 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 arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The 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 if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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 suit provisions. 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 the financing of minority and women outreach and training programs, the College reserves the rights to 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 all money due or to become due hereunder may be forfeited, for any violation of this Article of the Contract occurring after notice to the Contractor from the 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 language of 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 other contracts 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 rights against 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 employees of 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 of the 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 particular the 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 any State 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, as defined 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 employee has 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 State vendor 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, any State 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 services by 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 the Executive 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 of a 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.



Technical Specifications for:

**The College of New Jersey
Cogeneration Plant
Heat Recovery Steam Generator (HRSG)
Renewal**

Issued for Bid

May 31, 2019

Prepared by:

Burns

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**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 for the 2019 Cogeneration Plant Heat Recovery Steam Generator (HRSG) Renewal project.
 - 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 contractors 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.
 - 3. 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 01010

1 **SECTION 01025 – MEASUREMENT AND PAYMENT**

2
3 PART 1 - GENERAL

4
5 1.01 SCHEDULE OF VALUES

6
7 A. Each Contractor shall prepare a schedule of values in coordination with the preparation of progress
8 schedule. Correlate line items with other administrative schedules and forms required for the work,
9 including progress schedule, payment request form, listing of subcontractors, schedule of allowances if
10 any, schedule of alternates if any, listing of products and principal suppliers and fabricators, and schedule
11 of submittals. Break down principal subcontract amounts into multiple line items for each entity of work.
12 Round off to nearest whole dollar, but with total equal to Contract Sum. Submit 4 copies of schedule of
13 values to the Owner and Architect for review and approval.

- 14
15 • **Upon Owner/Architect approval, Owner will return the Schedule of Values to the Contractor**
16 **for the Contractor to submit to the bonding company for their acceptance. Payments will not**
17 **be made to the Contractor until the bonding company has provided a written acceptance to the**
18 **Owner.**

19
20 B. The schedule of values shall be tabulated into subcontracts and trades with the Quantity, Labor, Material,
21 and Total Cost indicated. The Schedule of Values shall include such items as bonds, insurance, allowances
22 and alternates, punchlist/close out documents and shall enclose copies of invoices and/or cancelled checks
23 from bonding and insurance agents.

24
25 C. Schedule of values shall be submitted on AIA Form G703 or similar form approved by the Architect and
26 Owner.

27
28 D. Each Contractor's monthly application for payment shall be in the same schedule form, reflecting the
29 same items from above. Unit costs shall be realistic for their part of the Work.

30
31 1.02 CHANGES IN THE WORK

32
33 A. When a change in the Work includes a category or categories of Work both added to and deducted from
34 the Contract, the total quantities of added Work and of deleted Work shall be determined separately for
35 each category and the appropriate unit price or net cost of the Work shall be applied to the difference
36 between the two total quantities.

37
38 B. Unit prices shall be inclusive of all costs and shall be applied to units of measure as defined in the
39 Specifications for each category of Work.

40
41 C. For all extra Work performed by the Contractor, the gross cost to the Owner shall include the net cost of
42 the Work to the Contractor plus an allowance for overhead and profit not to exceed 15% of the net cost.

43
44 D. For all extra Work performed by a Subcontractor, the gross cost to the Owner shall include the net cost of
45 the Work to the Subcontractor plus an allowance for overhead and profit not to exceed 15% of the net
46 cost, plus the Prime Contractor's overhead and profit not to exceed 5% of the Subcontractor's cost.

47
48 E. Net cost of extra Work shall be the actual or pro-rated cost of:

- 49
50 1. Labor, including foreman, at the prevailing rate of wages, contributions and taxes.
- 51
52 2. Materials entering permanently into the Work, including delivery to the site.
- 53
54 3. The ownership or rental cost of construction equipment and expendable tools, pro-rated for the time
55 necessary for the Work.

1
2 4. Power and consumable supplies for the operation of power equipment, pro-rated for the time
3 necessary for the Work.

4
5 5. Insurance and Bonds.

6
7 F. Gross costs shall be net costs plus the mark up allowances described above, such mark up allowances
8 being inclusive, of all cost of superintendence, supervision, engineering, overhead, profit, administrative
9 and site office expenses and all other general expenses.

10
11 1.03 APPLICATIONS FOR PAYMENT

12
13 A. Except as otherwise indicated, sequence of progress payments for the Contractor shall be regular, and
14 each shall be consistent with previous applications and payments. It is recognized that certain
15 applications involve extra requirements, including initial applications, applications at times of substantial
16 completion, and final payment applications.

17
18 B. Payment Application Forms: Use AIA Document G702 and G703 Continuation Sheets; available from
19 Publications Distribution Div., The American Institute of Architects, 1735 New York Ave., N.W.,
20 Washington, D.C. 20006 (also available at most local AIA chapter offices).

21
22 C. Except as otherwise indicated, complete every entry provided on the form, including notarization and
23 execution by authorized persons. Incomplete applications will be returned by Architect and Owner
24 without action. Entries shall match current data of schedule of values, progress schedules and reports.
25 Listing shall include amounts of fully executed change orders issued prior to first day of the period of
26 construction covered by application. Applications for payment shall include weekly payroll report.
27 Contractor shall furnish to the Owner certified payroll reports for each payroll period with pay request,
28 indicating name craft, social security number and actual hourly rate of wages paid to each workman
29 employed on the project. A certified payroll record is defined as "a payroll record which is attested to by
30 the employer, or corporate officer of such company, or an authorized agent of the employer." A payment
31 request will not be paid until the Owner receives the certified payrolls.

32
33 D. Submit one "pencil" copy of each proposed payment application to the architect and owner, for review,
34 not less than seven days prior to formal submissions of application.

35
36 E. Submit 4 executed copies of each payment application. Transmit with a transmittal form listing
37 attachments, and recording appropriate information related to application.

38
39 F. Breakdown may include a line item for General Conditions. General Conditions shall include the cost of
40 general supervision, trailers, temporary utilities and other general expenses directly related to the project
41 and not considered overhead. The general conditions item shall be billed on monthly progress payments
42 on a percentage of work completed.

43
44 1.04 INITIAL PAYMENT APPLICATION

45
46 A. The principal administrative actions and submittals which shall precede or coincide with submittal of the
47 Contractor's first payment application can be summarized as follows, but not necessarily by way of
48 limitation.

49
50 1. Listing of subcontractors and principal suppliers and fabricators.

51
52 2. Schedule of values.

53
54 3. Schedule of principal products.
55

- 1 4. Schedule of submittals (preliminary if not final).
- 2
- 3 5. Copies of acquired building permits and similar authorizations and licenses from governing
- 4 authorities for current performance of the work.
- 5
- 6 6. Data needed by Owner to secure related insurance coverages.
- 7
- 8 7. Performance and Payment Bond.
- 9
- 10 8. Insurance Certificates.

11
12 1.05 PROGRESS PAYMENTS

13
14 A. Based upon application for payments submitted to the Architect and the Owner, by the Contractor, on or

15 about the 25th day of each month for the period ending the last day of the previous second month, and

16 Certificate of Payment issued by the Architect and the Owner, the Owner will make progress payments on

17 account of the Contract Sum to the Contractor as follows:

- 18 1. On or after the 20th day of each month, the Contractor shall submit to the Architect and Owner a
- 19 "pencil copy" indicating the previous payment and the proposed amounts for each line item for the
- 20 current period. After review and approval or changes, the Contractor shall prepare the final billing
- 21 for presentation to the Architect and Owner.
- 22
- 23 2. a. Whenever any contract, the total price of which exceeds \$100,000, entered into by a State college,
- 24 for the construction, reconstruction, alteration or repair of any building, structure, facility or other
- 25 improvement to real property, requires the withholding of payment of a percentage of the amount of
- 26 the contract, the contractor may agree to the withholding of payments in the manner prescribed in the
- 27 contract, or may deposit with the State college registered book bonds, entry municipal bonds, State
- 28 bonds or other appropriate bonds of the State of New Jersey, or negotiable bearer bonds or notes of
- 29 any political subdivision of the State, the value of which is equal to the amount necessary to satisfy
- 30 the amount that otherwise would be withheld pursuant to the terms of the contract. The nature and
- 31 amount of the bonds or notes to be deposited shall be subject to approval by the State college. For
- 32 purposes of this section, "value" shall mean par value or current market value, whichever is lower.

33
34
35 If the contractor agrees to the withholding of payments, the amount withheld shall be deposited, with

36 a banking institution or savings and loan association insured by an agency of the Federal government,

37 in an account bearing interest at the rate currently paid by such institutions or associations on time or

38 savings deposits. The amount withheld, or the bonds or notes deposited, and any interest accruing on

39 such bonds or notes, shall be returned to the contractor upon fulfillment of the terms of the contract

40 relating to such withholding. Any interest accruing on cash payments withheld shall be credited to

41 the State college.

42
43 b. Any contract, the total price of which exceeds \$100,000, entered into by a State college involving

44 the construction, reconstruction, alteration, repair or maintenance of any building,

45 structure, facility or other improvement to real property, shall provide for partial

46 payments to be made at least once each month as the work progresses, unless the

47 contractor shall agree to deposit bonds with the State college pursuant to section 1.

48
49 c. 1. With respect to any contract entered into by a State college pursuant to section 2 for which the

50 contractor shall agree to the withholding of payments pursuant to section 1, 2% of the

51 amount due on each partial payment shall be withheld by the State college pending

52 completion of the contract.

53
54 2. Upon acceptance of the work performed pursuant to the contract for which the contractor has

55 agreed to the withholding of payments pursuant to subsection a. of this section, all

1 amounts being withheld by the State college shall be released and paid in full to the
2 contractor within 45 days of the final acceptance date agreed upon by the contractor
3 and the State college, without further withholding of any amounts for any purpose
4 whatsoever, provided that the contract has been completed as indicated. If the State
5 college requires maintenance security after acceptance of the work performed pursuant
6 to the contract, such security shall be obtained in the form of a maintenance bond. The
7 maintenance bond shall be no longer than two years and shall be no more than 100% of
8 the project costs.
9

10 d. This act shall take effect immediately. This bill supplements the "State College Contracts Law,"
11 P.L.1986, c.43 (C.18A:64-52 et seq.), and applies to any State college contract for over \$100,000
12 which involves the construction, reconstruction, alteration or repair of any building, structure, facility
13 or other improvement to real property. Under the provisions of this bill, whenever a contract of this
14 type requires the withholding of payment of a percentage of the amount of the contract, the
15 contractor would have the choice of either agreeing to a retainage deduction from each monthly
16 progress payment, or the contractor could choose to deposit bonds in the amount necessary to satisfy
17 the amount that otherwise would be withheld under the contract. If a contractor chooses a retainage
18 deduction from each monthly payment, then the retainage would be limited to 2% of the amount due
19 on each partial payment. Upon acceptance of the work performed pursuant to the contract for which
20 the contractor has agreed to a retainage deduction, all amounts being withheld by the State college
21 must be paid in full to the contractor within 45 days of the final acceptance date agreed upon by the
22 contractor and the State college. The bill provides that if the State college requires maintenance
23 security after acceptance of the work performed under the contract, the security must be obtained in
24 the form of a maintenance bond, which is required to be no longer than two years and no more than
25 100% of the project costs. The provisions of this bill are similar to provisions in the "Local Public
26 Contracts Law," P.L.1971, c.198 (C.40A:11-1 et seq.) and the "Public School Contracts Law,"
27 P.L.1977, c.114 (C.18A:18A-1 47 et seq.).
28

- 29 3. Upon substantial completion, the retainage shall, upon the Architect/Owner's approval, remain at 2%
30 of the value of work completed. Final release of retained monies will occur only upon the total
31 completion of all punch list and closeout documentation to the satisfaction of the Architect and
32 Owner.
33
- 34 4. For each day's delay in the Contractor's submission of an application for payment acceptable to the
35 Architect and Owner, the Owner may delay one day in making his progress payment.
36
- 37 5. Owner shall make payments within 30 days of receipt of said monthly pay requisition.
38

39 1.06 APPLICATION AT TIME OF SUBSTANTIAL COMPLETION
40

41 A. Following issuance of certificate of substantial completion on each Contractor's work, and also in part as
42 applicable to prior certificates on portions of completed work as designated, a "special" payment applica-
43 tion may be prepared and submitted by Contractor. The principal administrative actions and submittals
44 which shall precede or coincide with such special applications can be summarized as follows, but not
45 necessarily by way of limitation:
46

- 47 1. Occupancy permits and similar approvals or certifications by governing authorities and franchised
48 services, assuring Owner's full access and use of completed work.
49
- 50 2. Warranties, guarantees, maintenance agreements and similar provisions of Contract Documents.
51
- 52 3. Test/adjust/balance records, maintenance instructions, meter readings, start up performance reports,
53 and similar change over information germane to Owner's occupancy, use, operation and maintenance
54 of completed work.
55

- 1 4. Final cleaning of the work.
- 2
- 3 5. Application for reduction (if any) of retainage, with consent of surety.
- 4
- 5 6. Advice to Owner on coordination of shifting insurance coverages, including proof of extended
- 6 coverage as required.
- 7
- 8 7. Listing of Contractor's incomplete work, recognized as exceptions to certificate of substantial
- 9 completion.

10
11 1.07 FINAL PAYMENT APPLICATION

- 12
- 13 A. The administrative actions and submittals which shall precede or coincide with submittal of the
- 14 Contractor's final payment application can be summarized as follows, but not necessarily by way of
- 15 limitation.
- 16
- 17 1. Completion of project closeout requirements.
- 18
- 19 2. Completion of items specified for completion beyond time of substantial completion, regardless of
- 20 whether special payment application was previously made.
- 21
- 22 3. Assurance, satisfactory to Owner and Owner, that unsettled claims will be settled and that work not
- 23 actually completed and accepted will be completed without undue delay.
- 24
- 25 4. Transmittal of required project construction records to Owner via the Owner.
- 26
- 27 5. Proof, satisfactory to Owner and Owner, that taxes, fees and similar obligations of Contractor have
- 28 been paid.
- 29
- 30 6. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.
- 31
- 32 7. Notarized consent of surety for final payment.

33
34 1.08 WAIVER OF LIENS

- 35
- 36 A. Each Contractor, for himself, and for all Subcontractors and material men, agrees that no mechanic's lien
- 37 or other claim shall be filed or maintained by the Contractor or by any Subcontractor, materialmen,
- 38 laborer or any other person whatsoever for, or on account of any work performed or materials furnished
- 39 under this Contract. This agreement shall be an independent contract, and the Contractor shall execute
- 40 and deliver a separate Waiver of Liens in form and substance satisfactory to the Architect and Owner
- 41 contemporaneously with the execution of the Owner-Contractor Agreement and before any work is begun
- 42 at the site.
- 43
- 44 B. In every subcontract entered into by each Contractor after execution of this Contract or in connection
- 45 herewith, the Contractor shall incorporate a provision, similar to the foregoing paragraph, to the effect
- 46 that neither the Subcontractor nor any party acting through or under him shall file or maintain any
- 47 mechanic's lien or other claim against the Architect or Owner in connection with the Work.
- 48

49 **END OF SECTION 01025**

1 **SECTION 01100 - PROJECT PROCEDURES**

2
3 PART 1 - GENERAL

4
5 1.01 SPECIAL REQUIREMENTS

- 6
7 A. Schedule: Contractor shall provide a master schedule showing sequencing of work utilizing the CPM
8 method. The Contractor shall supply a schedule with all subcontractor activities, relationships, and
9 durations, utilizing the CPM method via SureTrak/Primavera, Version 3.0, or a Microsoft scheduling
10 software to the Owner on a working version CDrom and coordinate their schedule with the Owner.
11 • The Contractor is required to update at the end of each month the CPM Schedule based on the
12 percentage completed for each activity on the approved schedule (in concert with the submission of
13 the percentage completed in the monthly proposed schedule of values).
14 • **The contractor in their bid includes a cost of \$500.00 per month for this schedule submission,**
15 **for the duration of construction (per the milestone schedule in the bidding documents). This**
16 **only applies to projects in excess of 2 million dollars in base price price. The contractors**
17 **schedule of values shall include this cost, and can only be billed for upon TCNJ's successful**
18 **receipt of said schedule. Should any schedule not be received at the end of any month during**
19 **construction, TCNJ will issue a deduct change order in the amount of \$500.00 to the**
20 **contractor.**
21
22 B. Each Contractor shall take all necessary precautions to ensure the safety of all structural elements during
23 all phases of all work. No materials, cranes, trucks or any other construction loads shall be placed on any
24 part of the structure until the Contractor has determined the adequacy of that structure to carry the
25 intended load without damage or overstress.
26
27 C. Entrance into, or other use of the building will not be permitted except as may be necessary for the
28 execution of the Work, and shall be subject to the restrictions and instructions of the Owner.
29 **NOTE: any personnel working in any residence hall, including delivery personnel are to have a**
30 **State Police Background check completed before entering any residence hall. Contractor is**
31 **to provide the background check for all personnel at the kick off meeting, and/or prior to**
32 **start of their work. Should a person not have a background check but is on site for a short**
33 **period of time, said person shall be escorted by a TCNJ project manager/superintendent and**
34 **/or a designated person that has provided the appropriate back ground check information.**
35 **All back ground checks will be forwarded to TCNJ police for review and filing.**
36 **NOTE: any personnel working in a residence hall must where a badge with the name of the**
37 **vendor/contractor they work for and their personal name. This badge must be worn at all**
38 **times.**
39
40 D. Routes of ingress and egress to areas where work is being performed shall be subject to the restrictions
41 and instructions of the Owner.
42
43 E. Materials shall be moved through the Building using rubber tired vehicles which shall be properly con-
44 trolled at all times to avoid damage to existing wall, floor or ceiling surfaces.
45
46 F. Water damage cannot be tolerated and it is incumbent upon Contractors to take any steps necessary to
47 keep the existing premises dry at all times.
48
49 G. Any damage to the new building from heavy equipment, striking the Building or any other damage to any
50 part of the premises shall be repaired at the expense of the Contractors.
51
52 H. All welding and cutting shall be performed by qualified and certified welders. Certificates shall be on file
53 with the Contractor prior to commencement of any welding.
54
55 I. No work shall start before 8:30am.unless agreed to in advance with the College.

1
2
3 PART 2 - PRODUCTS

4 NOT APPLICABLE
5
6

7 PART 3 - EXECUTION
8

9 3.01 GENERAL
10

- 11 A. Contractors shall perform the work on or about the premises in a careful manner with full consideration to
12 fire protection as required by the National Fire Protection Association Standards, National Board of Fire
13 Underwriters and State and Local Departments having jurisdiction. Fire resistant materials shall be used
14 for temporary enclosures.
15
16 B. Chemical extinguishers approved by the Owner shall be provided by the General Contractor during the
17 progress of the work where and as required by the Owner, the Local Fire Marshal and the National Board
18 of Fire Underwriters.
19
20 C. The Contractor shall maintain an active program of fire prevention to keep workmen fire conscious
21 during the entire life of the Contract. Designate one member of the organization to execute and
22 coordinate fire control measures of his own organization and that of all subcontractors under his
23 jurisdiction.
24
25 D. All sub-contractors shall cooperate with the Contractor in carrying out the above program.
26
27 E. Storage of flammable materials will not be permitted in the Building unless written permission is obtained
28 from the Owner. Storage of all such materials shall be the Contractors' responsibility.
29
30 F. On-site open burning of rubbish, garbage, trade waste, leaves or plant life is prohibited.
31
32 G. Safety Program: The Contractor shall institute a safety program in accordance with OSHA and any local,
33 state, or federal guidelines. The contractor shall name a safety officer to monitor this program and shall
34 submit a safety report at job meetings.
35
36 H. Stockpiling: Stockpiling of materials on site will be allowed (but limited due to the limited space on this
37 site). Such materials shall not impair or impede the functioning of the facility. Materials stored on site
38 shall be secured to prevent loss from theft, damage, vandalism or fire. By stockpiling materials on site,
39 the contractor assumes full responsibility for said materials, and shall protect them to the fullest extent
40 possible. Specific locations for stockpiling materials shall be coordinated with the Architect, and Owner.
41
42 I. Safety Barriers: The Contractor shall erect safety barriers to deter and prohibit unauthorized access to the
43 construction site; such barriers may take the form of fences and shall be clearly marked with signage
44 prohibiting unauthorized access. The Contractor shall be responsible for safety barriers within the
45 building. The contractor shall be liable for damages to persons or property due to the construction
46 process if adequate safety measures are not undertaken. The Owner and Architect shall review safety
47 precautions for their adequacy but shall not be held liable for Contractors failure to maintain or provide
48 adequate protection.
49
50 J. Sequencing: The Contractor will work with the Sub-Contractors to sequence the work during the
51 submission of monthly project schedules. Contractors shall endeavor to coordinate their work efforts
52 with the Owner's requirements. Interruptions of utility services shall be coordinated with the Architect,
53 and Owner, but in no instance shall last longer than 2 hours.
54
55 K. Limited staging and on site parking will be provided by General Contractor. The Contractor will

1 coordinate parking areas with all the subcontractors and TCNJ.
2

3 1. Parking will be available at Carlton Avenue. Contractor will provide shuttle service to and from
4 the site.
5

6 2. Contractor will be permitted to have vehicles on site with in the construction fencing only.
7 Contractor is to provide stone in all parking areas on site to prevent the buildup of ruts and mud, thus
8 minimizing the amount of mud leaving the site and being left behind on TCNJ roads.
9

10 L. Site Utilities: Electric power and water are available on site. Toilet facilities will be made available by
11 the Contractor. These facilities shall remain clean by the Contractors throughout the course of the
12 project. The Contractors shall repair and/or replace any damaged fixtures, partitions, etc. The Electrical
13 Sub-Contractor shall tie in a temporary power panel (or panels as required) for all trades to use during
14 construction. Interruption of building services shall not occur without prior consent and coordination by
15 the Owner and Owner.
16

17 1. Provide portable toilets for all construction personnel.
18

19 M. Construction Lighting: The Electrical Sub-Contractor shall run sufficient strings and fixtures to maintain
20 a 50 foot-candle/sq.ft.intensity of light throughout the project areas.
21

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

- 25 • Contractor is to provide adequate manpower during the entire course of the project to maintain the
26 site in a clean, neat and professional manner. At a minimum the contractor is to clean the entire
27 site twice per week (on different days) by picking up all debris in and around the site. Sweeping
28 the entire building daily is required once the floor slabs are in place. Contractor is to place
29 garbage cans on each floor minimum 3 per floor in designated locations to assist in keeping the
30 site clean. The owner will not tolerate a building project that is not maintained in a professional
31 manner at all times.
32
33
34

35 3.02 PROGRESS MEETINGS 36

37 A. Progress Meetings shall be held bi-weekly at the job site at a regular time and day mutually agreed upon.
38 The frequency may be changed by the Architect or Owner to reflect current conditions. The Contractors,
39 those of his/their subcontractors concerned with current progress or with scheduling of future progress,
40 the Architect, the Owner, and the Owner shall each be represented at these job meetings by persons
41 familiar with the details of the work and authorized to conclude matters relative to work progress,
42 establishment of progress schedules, etc., as may be necessary to expedite completion of the work.
43

44 B. The Contractors and his/their subcontractors attending these meetings shall present complete and definite
45 reports as to the status of their respective work, conditions of product and equipment manufacturer, labor
46 availability, productivity and cooperation, shipping data, time of completion, sequence of the work, safety
47 program, and any other information bearing upon the execution of the Contract or subcontract. For the
48 Owner's convenience the Owner will chair the meetings.
49

50 3.03 MONTHLY REPORTS

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

- 54 a. Project overview
- 55 b. Financial status

- 1 c. Updated project schedule
- 2 d. Change order request log
- 3 e. Submittal log
- 4 f. RFI log
- 5 g. Owner/Architect issues that need immediate resolution
- 6 h. Order/delivery issues
- 7
- 8

9 **B. The Contractor is to provide TCNJ with this monthly report, and include in their bid a cost of**
10 **\$500.00 per month for all projects in excess of 2 million dollars base bid price for the duration of the**
11 **construction period as noted in the bidding milestone schedule. This total cost will be listed in the**
12 **contractor's schedule of values and can be billed for on a monthly basis only if said report is received**
13 **in whole as noted above. Should TCNJ not receive said complete report a deduct change order will**
14 **be issued to the contractor for \$500.00 for that month.**

15
16
17 **END OF SECTION 01100**

1 **SECTION 01300 – SUBMITTALS AND SUBSTITUTIONS**

2
3 PART 1 – GENERAL

4
5 1.1 PROGRESS SCHEDULE / COORDINATION DRAWINGS

- 6
7 A. The Contractor's schedule, shall coordinate with all trades to produce a coordinated CPM via
8 Suretrak/Primavera version 3.0 or a Microsoft scheduling program schedule indicating the start and
9 completion dates for each portion of the work as defined by the schedule of values, with the total time as
10 defined by the contract time and milestone dates as set forth in these specifications. The Contractor's
11 CPM schedule shall be submitted in electronic format (Suretrak 3.0 or a Microsoft Scheduling program)
12 to and reviewed by the Owner and Architect prior to first application for payment. Any revisions or
13 additional information requested by the Owner or Architect shall be provided. (No payment shall be
14 made to any Contractor not providing a schedule that reflects their entire work).
15 • Also refer to Section 01100-1 – Project Procedures.
16
17 B. The Contractor shall revise the progress schedule on a monthly basis as the work progresses reflecting
18 therein any delays, including those not within the Contractor's control, or accelerations in the progress of
19 the work. The progress schedule, as revised for any weekly period, shall be discussed at the bi-weekly job
20 meetings with the, Owner, the Architect, and the Contractor and the major trades in order to insure that
21 the percentage of actual completion of any portion of the work as called for in the progress schedule for
22 that bi-weekly period is attained. Monthly updates to the progress schedule shall be made prior to
23 application for payment.
24
25 C. Should any delay occur in the progress of the work or any portion thereof, the Contractor shall be
26 required to implement all necessary measures to accelerate the construction, to meet the percentages of
27 completion dictated by the progress schedule on the applicable dates, without additional cost to the
28 Owner.
29

30 1.2 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- 31
32 A. Shop drawings, product data and samples will not be processed by the Owner and/or Architect until the list
33 of subcontractors, material suppliers and fabricators is submitted as required under Paragraph 3.12 of the
34 General Conditions.
35 • The successful Contractor shall submit their list of proposed substitutions with in 20 calendar
36 days of the Contract Award.
37 • The Architect shall be compensated on an hourly basis for review of all shop drawings or
38 samples that do not meet the requirements of the contract documents after two submissions.
39 The compensation shall be deducted from the contractors contract via a deduct change order,
40 or other means that both parties agree to.
41
42 B. Coordinate preparation and processing of submittals with performance of the work so that work will not
43 be delayed by submittals. Allow two weeks for review/approval by the Architect for the approval
44 process. Allow additional time if processing must be delayed to permit coordination with subsequent
45 submittals with others.
46
47 C. Provide permanent marking on each submittal to identify Project, date, Contractor, subcontractor,
48 submittal name, Specification section, drawing reference, and similar information to distinguish it from
49 other submittals. Show Contractor's executed review and approval marking and provide space (5" x 7")
50 for Architect's Action marking and space for Owner's review marking. Package each submittal
51 appropriately for transmittal and handling. Submittals received, which are lacking the above information,
52 will be returned without action. Submittals, which are received from sources other than through
53 Contractor's office, will be returned without action.
54

- 1 D. Each submission shall be complete, with all options clearly marked and with all components required for
2 the assembly fully described and detailed. Submissions missing important information will be returned
3 unchecked.
4
- 5 E. Transmittal Form: Submittals shall be accompanied by a transmittal form. Provide Contractor's
6 certification on form, ready for execution, stating that information submitted complies with requirements
7 of contract documents.
8 • Transmit all submittals and shop drawings to the Architect or Engineer with a copy of the transmittal
9 to the Owner.
10
- 11 F. Except as otherwise indicated in individual work sections, comply with requirements specified herein for
12 each indicated category of submittal. Provide and process intermediate submittals, where required
13 between initial and final, similar to initial submittals.
14
- 15 G. Maintain returned final set of samples at project site, in suitable condition and available for quality
16 control comparisons by Architect, and by Owner.
17
- 18 H. Do not proceed with installation of materials, products or systems until final copy of applicable shop
19 drawings, product data and samples are in possession of Installer.
20
- 21 I. Provide newly prepared shop drawings, on reproducible sheets, with graphic information at accurate
22 scale, with company name of preparer indicated. Show dimensions and note which are based on field
23 measurement. Identify materials and products in the work shown. Indicate compliance with standards,
24 and special coordination requirements. Do not allow shop drawing copies without appropriate final
25 Action markings by Architect to be used in connection with the work.
26
- 27 1. Initial and Intermediate Submittals: One correctable translucent reproducible print and 5 blue line
28 or black line prints; reproducible will be returned.
29 2. Final Submittal: 6 prints, plus 3 additional prints where required for maintenance manuals; 4 will
30 be retained and remainder will be returned, one of which shall be marked up and maintained by
31 Contractor as "Record Document".
32 3. Electronic submittals are acceptable in AutoCad format only. Contractor shall be responsible for
33 printing and distribution of multiple copies as required.
34
- 35 J. Collect required product data into one submittal for each unit of work or system; and mark each copy to
36 show which choices and options are applicable to the project. Include manufacturer's standard printed
37 recommendations for application and use, compliance with standards, application of labels and seals,
38 notation of field measurements that have been checked, and special coordination requirements. Maintain
39 one set of product data for each submittal at project site, available for reference by Architect and others.
40
- 41 K. Submittals will be accepted from the Contractor only. Submittals received from other entities will be
42 returned without review or action.
43 1. Submittals received without a transmittal form will be returned without review or action.
44 2. Transmittal form: Use a form matching the sample form attached to this section. Include the
45 following:
46 a. List of deviations.
47 b. The Contractor's certification signature.
48 3. Fill out a separate transmittal form for each submittal; also include the following:
49 a. Other relevant information.
50 b. Request for additional information.
51
- 52 L. Do not submit product data, or allow its use on the project, until compliance with requirements of
53 Contract Documents has been confirmed by Contractor. Submittal is for information and record unless
54 otherwise indicated. Initial submittal is final submittal unless returned promptly by Architect marked with
55 an Action that indicates and observed noncompliance. Submit 6 copies, plus 3 additional copies, which

1 will be returned, where required for maintenance manuals.

2 1. Electronic submittals are acceptable in 8 ½" x 11" format only.

3
4
5
6 M. Provide three (3) samples identical with final condition of proposed materials or products for the work.
7 Include range samples, not less than 3 units, where unavoidable variations between units of each set.
8 Provide full set of optional samples where Architect's selection is required. Prepare samples to match
9 Architect's sample where so indicated. Include information with sample to show generic description,
10 source or products name and manufacturer, limitations, and compliance with standards. Samples are
11 submitted for review and confirmation of color, pattern, texture and kind by Architect. Architect will not
12 test samples, except as otherwise indicated, for compliance with other requirements, which are therefore
13 the exclusive responsibility of the Contractor.

14
15 N. Upon receipt of a signed copy of the Architects' Waiver form, electronic copies of CAD drawings of the
16 Contract Documents will be provided by the Architect for Contractor's use in preparing submittals. Copy
17 of Waiver form is attached.

18
19 O. Product Selection Procedures: Procedures for product selection include the following:

20
21 1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product
22 and manufacturer, provide the named product or an equivalent.

23
24 2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or
25 "Source" name single manufacturers or sources, provide a product of the manufacturer or source
26 that complies with requirements, or an equivalent.

27
28 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of
29 names of both products and manufacturers, provide one of the products listed that complies with
30 requirements, or an equivalent. Comply with provisions of "Product Options and Substitutions,"
31 Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.

32
33 4. Manufacturers: Where specification paragraphs or subparagraphs titled "Manufacturers" introduce
34 a list of manufacturers' names, provide a product by one of the manufacturers listed, or an
35 equivalent, that complies with requirements. Comply with provisions of "Product Options and
36 Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent
37 product.

38
39 5. Product Options: Where Specification paragraphs or subparagraphs refer to "Product Options and
40 Substitutions," indicate that size, profiles, and dimensional requirements on Drawings are based on
41 a specific product or system; provide the specific product or system or an equivalent product or
42 system by another manufacturer. Comply with provisions of "Product Options and Substitutions,"
43 Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.

44
45 6. Basis of Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-
46 Design Products" introduce or refer to a list of manufacturers' names, provide either the specified
47 product or an equivalent. Drawings and Specifications indicate sizes, profiles, dimensions and
48 other characteristics that are based on the product names. Comply with the provisions of "Product
49 Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting
50 an equivalent product.

51
52
53 1.3 MISCELLANEOUS SUBMITTALS

54
55 A. Miscellaneous submittals related directly to the work include warranties, maintenance agreements,

1 workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports,
2 copies of industry standards, record drawings, field measurement data, operating and maintenance
3 materials, overrun stock, and similar information, devices and materials applicable to the work and not
4 processed as shop drawings, product data or samples.
5

6 B. Refer to sections for specific general requirements on warranties, product/workmanship bonds, and
7 maintenance agreements. In addition to copies desired for Contractor's use, furnish 2 executed copies,
8 except furnish 3 additional copies where required for maintenance manuals.
9

10 C. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases,
11 jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents,
12 correspondence and records established in conjunction with compliance with standards and regulations
13 bearing upon performance of the work.
14

15 1.4 PRODUCT OPTIONS AND SUBSTITUTIONS

16 A. DEFINITIONS

17 1. Products: Items purchased for incorporating into the Work, whether purchased for Project or
18 taken from previously purchased stock. The term "product" includes the terms "material,"
19 "equipment," "system," and terms of similar intent.
20

21 a. Named Products: Items identified by manufacturer's product name, including make or
22 model number or other designation, shown or listed in manufacturer's published product
23 literature, that is current as of date of the Contract Documents.
24

25 b. New Products: Items that have not previously been incorporated into another project or
26 facility, except that products consisting of recycled-content materials are allowed, unless
27 explicitly stated otherwise. Products salvaged or recycled from other projects are not
28 considered new products.
29

30 c. Equivalent Product: Product that is demonstrated and approved through submittal process,
31 or where indicated as a product substitution, to have the indicated qualities related to type,
32 function, dimension, in-service performance, physical properties, appearance, and other
33 characteristics that equal or exceed those of specified product.
34

35 2. Substitutions: Changes in products, materials, equipment, and methods of construction from those
36 required by the Contract Documents and proposed by Contractor.

37 3. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and
38 accompanied by the words "basis of design," including make or model number or other
39 designation, to establish the significant qualities related to type, function, dimension, in-service
40 performance, physical properties, appearance, and other characteristics for purposes of evaluating
41 comparable products of other named manufacturers.

42 4. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a
43 particular product and specifically endorsed by manufacturer to Owner.

44 5. Special Warranty: Written warranty required by or incorporated into the Contract Documents,
45 either to extend time limit provided by manufacturer's warranty or to provide more rights for
46 Owner.
47

48 B. General Requirements:

49 1. The requirements for substitutions do not apply to specified Contractor options on products and
50 construction methods. Revisions to Contract Documents, where requested by Owner or Architect
51 are changes, not substitutions. Contractor's determination of and compliance with governing
52 regulations and orders issued by governing authorities do not constitute substitutions and do not
53 constitute a basis for change orders. Otherwise, Contractor's requests for changes in products,
54 materials, and methods of construction required by Contract Documents are considered requests
55

- 1 for substitutions, and are subject to requirements hereto.
- 2 2. To the greatest extent possible, provide products, materials and equipment of a singular generic
3 kind
4 and from a single source.
- 5 3. Where more than one choice is available as options for Contractor's selection of a product or
6 material, select an option that is compatible with other products and materials already selected.
7 Total compatibility among options is not assured by limitations within Contract Documents, but
8 shall be provided by Contractor. Compatibility is a basic general requirement of product/material
9 selections.
- 10 4. Any and all contractor substitutions that require additional work by other trades not specifically
11 called for in the documents shall be paid for by the contractor requesting the substitution if any
12 other trade increase is required.
- 13 5. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or
14 other considerations, after deducting additional responsibilities Owner must assume. Owner's
15 additional responsibilities may include compensation to Architect for redesign and evaluation
16 services, increased cost of other construction by Owner, and similar considerations.
- 17
- 18 C. Submittals: Submit 6 copies, utilizing Substitution Request Form, CSI Form 13.1.A, fully identified for
19 product or method being requested for substitution, including related specification section and drawing
20 numbers, and fully documented to show compliance with requirements for substitutions. Include product
21 data/drawings, description of methods, samples where applicable, Contractor's details comparison of
22 significant qualities between specified item and proposed substitution, statement of effect on construction
23 time and coordination with other affected work and contractors, cost information or proposal, warranty
24 information, compatibility with other work, approval of all authorities having jurisdiction, and
25 Contractor's statement to the effect that proposed substitution will result in overall work equal to or better
26 than work originally indicated.
- 27
- 28 D. Contractor's options for selecting products are limited by Contract Documents requirements, and
29 governing regulations. Required procedures include, but are not necessarily limited to, the following for
30 various indicated methods or specifying:
- 31
- 32 1. Single product/manufacturer name; provide product indicated or equivalent, except advise
33 Architect before proceeding, where known that named product is not a feasible or acceptable
34 selection.
- 35 2. Two or more product/manufacturer names; provide one of the named products or equivalent, at
36 Contractor's option; but excluding products which do not comply with requirements. Advise
37 Architect before proceeding.
- 38 3. Equivalent; where named products in Specifications text are accompanied by the term "or
39 equivalent", or other language of similar effect, comply with those Contract Documents provisions
40 concerning substitutions for obtaining Architect's approval of equivalent product.
- 41 4. Named, except as otherwise indicated, is defined to mean manufacturer's name for product, as
42 recorded in published product literature, of latest issue as of date of Contract Documents. Refer
43 requests to use products of a later or earlier model to Architect for acceptance before proceeding.
- 44 5. Where compliance with an imposed standard, code or regulation is required, selection from among
45 products that comply with requirements including those standards, codes and regulations, is
46 Contractor's option.
- 47 6. Provide products which comply with specific performances indicated, and which are recommended
48 by manufacturer, in published product literature or by individual certification, for application
49 indicated. Overall performance of a product is implied where product is specified for specific
50 performance.
- 51 7. Provide products that have been produced in accordance with prescriptive requirements, using
52 specified ingredients and components, and complying with specified requirements for mixing,
53 fabricating, curing, finishing, testing and similar operations in manufacturing process.
- 54 8. Where matching of an established sample is required, final judgment of whether a product
55 proposed by Contractor matches sample satisfactorily is Architect's judgment. Where no product

1 within specified cost category is available, which matches sample satisfactorily and complies with
2 requirements, comply with Contract Document provisions concerning substitutions for selection of
3 a matching product outside established cost category or not complying with requirements.

- 4 9. Where specified product requirements include "...as selected from manufacturer's full range of
5 colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic
6 product data is to comply with requirements of the Contract, and selection shall be from the full
7 range of products within the requirements. Where specified product requirements include "... as
8 the industry...", or words to that effect, selection of product complying with requirements, is
9 Architect's selection, including designation of manufacturer, where necessary to obtain desired
10 color, pattern or texture.

11
12 E. Substitutions may be permitted by the Architect, if, in his opinion, the requirements of the proposed
13 substitution comply with the requirements specified for the material, article or piece of equipment;
14 however, the Architect is not required to permit substitution pursuant to the case of Whitten Corporation
15 vs. Paddock, Incorporated, United States District Court, Massachusetts, April 12, 1974, affirmed by the
16 Federal First Circuit Court, December 14, 1974.

17
18 F. After award of contract, the Contractor may submit substitutes to the Architect for review, fully
19 documented and certified, and accompanied by a proposal for a reduction in the Contract Sum.

20
21 G. Contractor's request for substitution will be received and considered when extensive revisions to Contract
22 Documents are not required and changes are in keeping with general intent of Contract Documents; when
23 timely, fully documented and properly submitted; and when one or more of following conditions is
24 satisfied, all as judged by Architect. Otherwise, requests will be returned without action except to record
25 noncompliance with these requirements.

- 26
27 1. Where request is directly related to an "equivalent" clause or other language of same effect in
28 Contract Documents.
29 2. Where required product, material or method cannot be provided within Contract Time, but not as a
30 result of Contractor's failure to pursue the work promptly or coordinate various activities properly.
31 3. Where required product, material or method cannot be provided in a manner which is compatible
32 with other materials of the work, or cannot be properly coordinated therewith, or cannot be
33 warranted (guaranteed) as required, or cannot be used without adversely affecting Owner's
34 insurance coverage on completed work, or will encounter other substantial noncompliances which
35 are not possible to otherwise overcome except by making requested substitution, which Contractor
36 thereby certifies to overcome such incompatibility, uncoordination, nonwarranty, noninsurability
37 or other noncompliance as claimed.
38 4. Where substantial advantage is offered Owner, in terms of cost, time or other valuable
39 considerations, after deducting offsetting responsibilities Owner may be required to bear, including
40 additional compensation to Architect for redesign and evaluation services, increased cost of other
41 work by Owner or separate Contractors, and similar considerations.

42
43 H. Contractor's submittal of, and Architect's acceptance of, shop drawings, product data or samples which
44 indicate work not complying with requirements of Contract Documents, does not constitute an acceptable
45 and valid request for, nor approval of, a substitution.

46
47 I. QUALITY ASSURANCE

48
49 Compatibility of Options: If Contractor is given option of selecting between two or more products for
50 use on Project, product selected shall be compatible with products previously selected, even if previously
51 selected products were also options.

- 52
53 1. Each contractor is responsible for providing products and construction methods compatible with
54 products and construction methods of other contractors.
55 2. If a dispute arises between contractors over concurrently selectable but incompatible products,

1 Architect will determine which products shall be used.
2

3 J. EQUIVALENT PRODUCTS
4

5 Where products or manufacturers are specified by name, Contractor must submit the following, in
6 addition to other required submittals, to obtain approval of an unnamed product proposed as an
7 equivalent:
8

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

19
20 1.5 OPERATION AND MAINTENANCE INSTRUCTIONS AND EQUIPMENT WARRANTIES
21

22 A. The Contractor shall orient and instruct the responsible maintenance personnel designated by the Owner
23 in the Operation of all equipment and shall provide the maintenance personnel with pertinent literature
24 and operational manuals for all equipment. Date and time of demonstrations shall be mutually agreed
25 upon with the Owner. Provide qualified personnel for as long as necessary to fully orient and instruct the
26 Owner. Contractor shall videotape instruction session and provide owner with completed video.
27

28 B. The manuals shall be submitted in (quadruplicate) 3-ring loose-leaf type binders to the Architect for
29 approval with all additional information that the Architect may request and considers necessary for the
30 proper servicing and maintenance of all equipment. Manuals are to include plain paper copies of
31 approved shop drawings and catalog cuts. The quality of the copies may be subject to approval by the
32 Architect. Upon completion and approval, 3 copies will be forwarded to the Owner and one copy
33 retained by the Architect.
34

35 C. Manuals shall include no less than the following:

- 36 1. Operating Procedures:
 - 37 a. Typewritten procedures indicating each mode of operation of each piece of equipment or
38 system. Procedures shall indicate the status of each component of a system in each
39 operating mode.
 - 40 b. Procedures shall indicate names, symbol numbers, valve tags, circuit numbers, schematic
41 control and wiring diagrams, locations of thermostats, manual starters, control cabinets, and
42 other controls of each system.
 - 43 c. Emergency shutdown procedures for each piece of equipment or system, both automatic and
44 manual as appropriate.
- 45 2. Maintenance Schedule: Typewritten schedule describing manufacturer's recommended schedule of
46 maintenance and maintenance procedures.
- 47 3. Catalog cuts and shop drawings:
 - 48 a. Catalog cuts shall clearly indicate the exact model and type of each piece of equipment
49 installed in the Project, including all options provided.
 - 50 b. Catalog cuts shall fully describe equipment including physical, electrical, mechanical and
51 other characteristics, performance characteristics and installation or erection diagrams.
 - 52 c. Catalog cuts shall indicate spare part numbers and name, address and telephone number of
53 local representative or service department.
- 54 4. Typewritten list of all subcontractors on the Project including name, address, telephone number
55 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 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

3.1 ACTION ON SUBMITTALS

A. One copy of all submissions will be returned to the Contractor for his files. The Contractor shall mark up 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.

3.2 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.

3.3 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

1 be accepted if the color schedule is late due to the failure of the Contractor to provide the Architect with
2 all required color information, nor will an extra be entertained if the selected color is not available from
3 the manufacturer the Contractor intended to use but neglected to submit.

4
5 C. The Contractors are reminded of the requirement to declare all substitutions within 20 days of execution
6 of their Contract as specified.

7 **END OF SECTION 01300**

1 **SECTION 01310 - QUALITY CONTROL**

2
3 **PART 1 - GENERAL**

4
5 1.01 TRADESMEN AND WORKMANSHIP

- 6
7 A. Each Contractor shall ensure that tradesmen performing work at site are skilled and knowledgeable in
8 methods and craftsmanship needed to produce required quality levels for workmanship in completed
9 work. Remove and replace work which does not comply with workmanship standards as specified and as
10 recognized in the construction industry for applications indicated. Remove and replace other work
11 damaged or deteriorated by faulty workmanship or its replacement.
12
13 B. In certain instances, specification text requires that specific work be assigned to specialists or expert en-
14 tities, who shall be engaged for performance of those units of work. These shall be recognized as special
15 requirements over which Contractor has no choice or option. These assignments shall not be confused
16 with, and are not intended to interfere with, normal application of regulations, union jurisdictions and
17 similar conventions. One purpose of such assignments is to establish which party or entity involved in a
18 specific unit of work is recognized as "expert" for indicated construction processes or operations.
19 Nevertheless, final responsibility for fulfillment of entire set of requirements remains with Contractor.
20

21 1.02 INSPECTION, TESTS AND REPORTS

- 22
23 A. Required inspection and testing services are intended to assist in determination of probable compliances
24 of the work with requirements, but do not relieve any Contractor of responsibility for those compliances,
25 or for general fulfillment of requirements of Contract Documents. Specified inspections and tests are not
26 intended to limit any Contractor's quality control program. Afford reasonable access to agencies perform-
27 ing tests and inspections.
28
29 B. Contractors are responsible for all testing associated with their work (foundations, soils compaction,
30 concrete, steel, roof material testing etc.) and shall submit the name of their proposed testing agency
31 within 15 days of Notice-to-Proceed. Each Contractor is responsible to coordinate the activities of the
32 testing agency to assure that work is tested prior to being covered up or other activities associated to the
33 work begin.
34

35 1.03 ROOF DRAIN TESTING

- 36 A. Pre-Construction Testing: Prior to the start of any work on the roof, the Contractor shall water-flow test all
37 roof drains (5 minutes at each drain), to determine if any full or partial drain clogs exist in the drainage
38 system.
39
40 1. The Owner shall have a representative at the test.
41 2. The results of the testing shall be reported to the Owner, in writing, prior to the start of work.
42 3. The Owner will be responsible for correction of any drain-age problems reported by the Contractor
43 prior to the start of work.
44 4. Any drains, piping or other components, whether exposed, concealed, below grade, etc., found to
45 be clogged after the start of construction, and not reported to the Owner prior to the start of
46 construction, shall be cleared, repaired or replaced as required to restore full drainage capacity. All
47 work shall be performed by the Contractor at no additional cost to the Owner, including patching,

1 repair or re-placement of any materials, finishes, landscaping, etc., disturbed in gaining access to
2 drainage components.

3
4 B. Post-Construction Testing: When all work reaches substantial completion, the Contractor shall water-flow
5 test all roof drains (5 minutes at each drain), to determine if any full or partial drain clogs exist in the
6 drainage

7 system.

8
9 1. The Owner shall have a representative at the test.

10 2. Report the results of testing to the Owner in writing prior to preparation of the final punchlist
11 inspection.

12 3. Any drains, piping or other components, whether exposed, concealed, below grade, etc., found to
13 be clogged shall be cleared, repaired or replaced as required to restore full drainage capacity. All
14 work shall be performed by the Contractor at no additional cost to the Owner, including patching,
15 repair or replacement of any materials, finishes, landscaping, etc., disturbed in gaining access to
16 drainage components.

17
18 1.04 ROOF DRAIN PROTECTION

19
20 A. Contractor is to make every effort to prevent materials from entering roof drains. Contractor is to install
21 roof rain filters prior to removal of any roof materials.

22
23 B. All debris is to be cleaned away from drains at the end of each day.

24
25 PART 2 - PRODUCTS

26
27 2.01 ROOF DRAIN FILTERS

28
29 A. Tiddy Gutter DF100001 Roof Drain Foam Filter or Equal.

30
31 PART 3 - EXECUTION

32
33 3.01 REPLACEMENT OF WORK

34
35 A. The Contractor shall, within 24 hours after rejection of Work, remove all materials and equipment so
36 rejected and immediately replace said Work, at his cost, to the satisfaction of the Architect. Should the
37 Work of the Owner or other Contractors be damaged by such removal or replacement, the Contractor shall

1 reimburse the Owner or other Contractors for all cost incurred for correcting said damage.
2

3 3.02 EXAMINATION
4

5 A. Existing Conditions: The existence and location of site improvements, utilities, and other construction
6 indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and
7 location of mechanical and electrical systems and other construction affecting the Work.
8

9 1. Before construction, verify the location and points of connection of utility services.
10

11 B. Existing Utilities: The existence and location of underground and other utilities and construction
12 indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence
13 and location of underground utilities and other construction affecting the Work.
14

15 1. Before construction, verify the location and invert elevation at points of connection of sanitary
16 sewer, storm sewer, and water-service piping; and underground electrical services.

17 2. Furnish location data for work related to Project that must be performed by public utilities serving
18 Project site.
19

20 C. Acceptance of Conditions prior to work starting: Examine substrates, areas, and conditions, with Installer
21 or Applicator present where indicated, for compliance with requirements for installation tolerances and
22 other conditions affecting performance. Record observations.
23

24 1. Written Report: Where a written report listing conditions detrimental to performance of the Work
25 is required by other Sections, include the following:
26

27 a. Description of the Work.

28 b. List of detrimental conditions, including substrates.

29 c. List of unacceptable installation tolerances.

30 d. Recommended corrections.

31 2. Verify compatibility with and suitability of substrates, including compatibility with existing
32 finishes or primers.

33 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of
34 connections before equipment and fixture installation.

35 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be
36 installed.

37 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding
38 with the Work indicates acceptance of surfaces and conditions.
39

40 3.03 PREPARATION
41

42 A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust,
43 move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances
44 located in or affected by construction. Coordinate with authorities having jurisdiction.
45

46 B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others
47 unless permitted under the following conditions and then only after arranging to provide temporary utility
48 services according to requirements indicated:
49

50 1. Notify Owner not less than two days in advance of proposed utility interruptions.

51 2. Do not proceed with utility interruptions without Owner's/Owner's written permission.
52

53 C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck
54 measurements before installing each product. Where portions of the Work are indicated to fit to other

1 construction, verify dimensions of other construction by field measurements before fabrication.
2 Coordinate fabrication schedule with construction progress to avoid delaying the Work.

3
4 D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on
5 Drawings.

6
7 E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for
8 clarification of the Contract Documents, submit a request for information to Architect. Include a detailed
9 description of problem encountered, together with recommendations for changing the Contract
10 Documents.

11
12 3.04 CONSTRUCTION LAYOUT

13
14 A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in
15 relation to existing conditions and dimensions. If discrepancies are discovered, notify Architect and
16 Owner promptly.

17
18 3.05 INSTALLATION

19
20 A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as
21 indicated.

- 22
23 1. Make vertical work plumb and make horizontal work level.
24 2. Where space is limited, install components to maximize space available for maintenance and ease
25 of removal for replacement.

26
27 B. Comply with manufacturer's written instructions and recommendations for installing products in
28 applications indicated.

29
30 C. Install products at the time and under conditions that will ensure the best possible results. Maintain
31 conditions required for product performance until Substantial Completion.

32
33 D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in
34 excess of that expected during normal conditions of occupancy.

35
36 E. Tools and Equipment: Only use the best quality tools and equipment with proper attenuations for the latest
37 acceptable sound levels.

38
39 F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in
40 place, accurately located and aligned with other portions of the Work.

- 41
42 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights
43 directed by Architect.
44 2. Allow for building movement, including thermal expansion and contraction.

45
46 G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange
47 joints for the best visual effect. Fit exposed connections together to form hairline joints.

48
49 H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
50

51 **END OF SECTION 01310**

1 **SECTION 01320 - TEMPORARY FACILITIES**

2
3 PART 1 - GENERAL

4
5 1.01 DESCRIPTION OF REQUIREMENTS

- 6
7 A. Specific administrative and procedural minimum actions are specified in this section, as extensions of
8 provisions in General Conditions and other Contract Documents. Nothing in this section is intended to
9 limit types and amounts of temporary work required, and no omission from this section will be
10 recognized as an indication that such temporary activity is not required for successful completion of the
11 work and compliance with requirements of Contract Documents.
12
13 B. Each Contractor is specifically assigned certain responsibilities for temporary facilities to be used by all
14 Contractors, other entities at the site, the Owner's work forces and other personnel including occupants of
15 the project, the Owner, the Architect, test agencies, personnel of governing authorities, and similar en-
16 tities and personnel authorized to be at the project site during construction. In general, each Contractor is
17 assigned the responsibilities for installation, operation and removal of each temporary facility which is
18 related by recognized trades to its scope of contract work; and, except as otherwise indicated, each is
19 responsible for costs and use charges associated therewith, including fuel, power usage, water usage and
20 similar usage costs. The Contractor is responsible for temporary facilities not related to any other
21 Contractor's scope of contract work and not otherwise specifically assigned, as designated by the
22 Architect.
23
24 C. No costs or usage charges for temporary facilities are chargeable to the Owner, nor can any Contractor's
25 cost or usage charges for temporary facilities be accepted as the basis for a change order extra. The total
26 costs and usage charges for temporary facilities are included, collectively, in the Contract Amounts.
27

28 1.02 GENERAL REQUIREMENTS

- 29
30 A. Each Contractor shall provide and operate all hoists, cranes, helicopters and furnish and erect all ladders
31 and scaffolding required by him and his subcontractors, constructed to afford proper protection to
32 craftsmen, their Work and other Work in progress and previously executed.
33

34 1.03 JOB CONDITIONS

- 35
36 A. Each Contractor shall establish and initiate use of each temporary facility at time first reasonably required
37 for proper performance of the total work of project. Terminate use and remove facilities at earliest
38 reasonable time, when no longer needed or when permanent facilities have, with authorized use, replaced
39 the need.
40
41 B. Each Contractor shall install, operate, maintain and protect temporary facilities in a manner and at loca-
42 tions that will be safe, nonhazardous, sanitary, protective of persons and property, and free of deleterious
43 effects.
44

45 1.04 ENVIRONMENTAL PROTECTION

- 46
47 A. Each Contractor shall provide facilities, establish procedures, and conduct construction activities in a
48 manner that will ensure compliance with environmental and other regulations controlling construction ac-
49 tivities at project site. The Contractor shall designate one person, the Construction Superintendent or
50 other, to enforce strict discipline on activities related to generation of wastes, pollution of air/water/soil,
51 generation of noise, and similar harmful or deleterious effects which might violate regulations or
52 reasonably irritate persons at or in vicinity of project site. Anti-pollution measures required by D.E.P., as
53 applicable are to be followed.
54

55 1.05 SECURITY

- 1
2 A. The Contractor shall maintain complete security on the site at all times during and outside of normal
3 working hours to protect the Work and all field offices, and to secure the area of construction by
4 restricting all trespassers.
5 • This means locking the doors and/or gates. A guard is not required.
6

7 1.06 TEMPORARY CONSTRUCTION FACILITIES
8

- 9 A. Where mud, snow, ice or other hazardous conditions exist in the purview (Scope of Work) of any Sub
10 Contractor, the Contractor shall remove the hazards immediately and replace with suitable material for
11 the other contractors use. If the Owner is compelled to remove the hazards with their own forces due to
12 inaction by the Contractor, then that Contractor will be back-charged for the work performed by the
13 Owner.
14
15 B. No welding, cutting by torch, or Work utilizing or causing flammable waste shall be done unless adequate
16 fire protection is provided and maintained for the duration of the Work in the area of operations.
17

18 1.07 DEBRIS CONTROL (Refer to Section 01524 for further delineation)
19

- 20 A. The Contractor shall be responsible for daily cleaning up of spillages and debris resulting from his
21 operations and from those of his Subcontractors; and shall be responsible for complete removal and
22 disposition of hazardous and toxic waste materials. The Contractor shall provide containers at grade,
23 sufficient for the depositing of nonhazardous/nontoxic waste materials, and shall remove such waste
24 materials from project site at least weekly during cold weather (daily high temperatures below 50°F) and
25 at least twice weekly during mild and warm weather.
26 • Contractor is responsible to provide and pay for all dumpsters.
27
28 B. The Contractor shall daily clean all mud, dirt and debris resulting from all trades operations from the
29 adjacent streets, sidewalks, drives and parking areas and shall repair all damage caused by the cleaning to
30 the satisfaction of the Owner.
31
32 C. The Contractor is to provide and maintain appropriate means of trash disposal (i.e., chutes) to
33 grade/dumpster. Multiple units may be required and shall be figured for in the bid.
34

35 PART 2 - EXECUTION
36

37 2.01 ENCLOSURES
38

- 39 A. At earliest possible date, the Contractor shall secure project area against unauthorized entrance at times
40 when personnel are not working. Provide secure temporary enclosure at ground floor and other locations
41 of possible entry, with locked entrances.
42
43 B. Where any form of demolition will expose the interior of the building to weather, demolition shall follow
44 the erection of weatherproof walls by the Contractor installed inside the demolition line, sealed and
45 flashed, as required, to keep all water from the building interior. Keep temporary weatherproofing in
46 place until new construction has been completed to the stage where water will not enter the building.
47
48 C. The Contractor shall provide constant protection against rain, wind, storms, frost or heat to maintain the
49 work, materials, apparatus and fixtures free from damage. At the end of each day's work, cover work
50 likely to be damaged. During cold weather, protect work from damage by freezing and provide such
51 enclosures and heating apparatus as may be necessary diligently to prosecute the Work without stoppage
52 for reason of unfavorable weather.
53

- 1 D. Wherever a Contractor provides openings through walls or slabs, each location shall be adequately
2 protected at the end of each working day with temporary enclosures to make these areas tight. Openings
3 through exterior walls shall be watertight.
4
- 5 E. Install an 8 foot high fence around the entire site with wind screening. Provide gates as needed to properly
6 access the site to complete the work. Remove the fence once the project is substantially completed. Fence
7 is to have poles into the ground where the fence will be untouched per a period of time, and can have feet
8 with sand bags in areas that the fence may have to be moved occasionally to not interfere with the work.
9
- 10 **F. For renovation projects: Contractor is to maintain the building in a water tight condition during all**
11 **construction activities by whatever means necessary. Contractor is to never do any more removal work**
12 **during any given day than that contractor can replace in the same day in order to make sure the**
13 **occupants of the building will be protected from the possibility of water leakage into the building. Should**
14 **any leakage occur, the contractor is to immediately make the building water tight (on a 24 hour basis)**
15 **and repair any damage caused by the leakage or replace any equipment damaged by the leakage.**
16

17 2.02 TEMPORARY ELECTRICITY

- 18
19 A. Power is available on site.
20

21 2.03 TEMPORARY VENTILATION

- 22
23 A. A trade requiring ventilation for Work shall provide fans to induce circulation of air.
24

25 2.04 TEMPORARY TELEPHONES

- 26
27 A. Each Contractor is responsible for their own telephone service and for payment of all charges relating to
28 that service.
29

30 2.05 TEMPORARY WATER

- 31
32 A. Water is available on site.
33

34 2.06 TEMPORARY SANITARY FACILITIES

- 35
36 A. Starting at time of start of work at project site, the Contractor shall provide and maintain self-contained
37 toilet units of type acceptable to governing authorities, adequate, at all stages of construction, for use of
38 personnel at project site. Provide separate facilities for male and female personnel when both sexes are
39 working, in any capacity, at project site. Facilities shall remain in use until completion of project. Use of
40 permanent facilities will not be permitted.
41

42 2.07 REMOVAL AND RESTORATION

- 43
44 A. Prior to acceptance of the Project, each contractor shall remove temporary work for which he has been
45 responsible.
46

47 2.08 OWNER'S RIGHTS

- 48
49 A. If any Contractor fails to carry out his responsibilities in providing temporary facilities, as set forth above,
50 the Owner shall have the right to take such action as he deems proper for the protection and conduct of
51 the Work, and to deduct the cost thereof from the amount due the Contractor at fault.
52

- 53
54 B. Extended work days, hours, shifts, weekend work, etc. may be allowed upon coordination and approval
55 by Architect, Owner at no additional cost to the Owner.

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- 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 01320

1 **SECTION 01322 – PHOTOGRAPHIC DOCUMENTATION**

2
3 PART 1 – GENERAL

4
5 1.01 RELATED DOCUMENTS

- 6
7 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
8 other Division 1 Specification Sections, apply to this Section.
9

10 1.02 SUMMARY

- 11
12 A. This Section includes administrative and procedural requirements for the following work by the General
13 Contractor (other primes are encouraged to document the site and construction, but not required):
14

15 1. Preconstruction videotapes.

- 16
17
18 B. Related Sections include the following:

19 1. All of Division 1.
20
21

22 1.03 SUBMITTALS

- 23
24 A. Qualification Data: For photographer.

- 25
26 B. Videotapes: Submit 3 copies of each videotape with protective sleeve or case within seven days of
27 recording. Remove safety tab to prevent accidental re-recording.
28

29 1. Identification: On each copy, provide an applied label with the following information:

30
31 a. Name of Project.

32 b. Name and address of photographer.

33 c. Name of Architect

34 d. Name of Contractor.

35 e. Date videotape was recorded.

36 f. Description of vantage point, indicating location, direction (by compass point), and
37 elevation or story of construction.
38

39 1.04 QUALITY ASSURANCE

- 40
41 A. Photographer Qualifications: An individual who has been regularly engaged as a professional
42 photographer of construction products for not less than three years.
43

44 1.05 COORDINATION

- 45
46 A. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including
47 access to project site and use of temporary facilities, including temporary lighting required to produce
48 clear, well-lit photographs without obscuring shadows.
49
50

51
52 1.06 USAGE RIGHTS

- 53
54 A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of
55 photographic documentation.

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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. Digital Photographer: Engage a qualified commercial videographer to record construction digital recordings.
- B. Preconstruction: Before starting demolition or construction record, videotape (digital) of Project site, interior and exterior.
 - 1. Show protection efforts by the Contractor.

END OF SECTION 01322

1 **SECTION 01330 – CONTRACT CLOSEOUT**

2
3 PART 1 – GENERAL

4
5 1.01 DEFINITION

- 6
7 A. Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for
8 final acceptance, final payment, normal termination of Contract, occupancy by Owner and similar actions
9 evidencing completion of the work. Specific requirements for individual units of work are specified in
10 sections of Divisions 2 through 16. Time of closeout is directly related to Substantial Completion, and
11 therefore may be either a single time period for entire work or a series of time periods for individual parts
12 of the work which have been certified as substantially complete at different dates. That time variation, if
13 any, shall be applicable to other provisions of this section.
14
15 B. Substantial completion shall be defined that every material item has been installed. Nothing is missing
16 and therefore, the punch list can begin.

17
18 1.02 PREREQUISITES TO SUBSTANTIAL COMPLETION

- 19
20 A. Prior to requesting the Architect's inspection for certification of substantial completion, for either entire
21 work or portions thereof, complete the following and list known exceptions in request:
22
23 1. In progress payment request coincident with or first following date claimed, show either 100%
24 completion for portion of work claimed as substantially complete, or list incomplete items, value
25 of incomplete items, and reasons for being incomplete.
26
27 2. Include supporting documentation for completion as indicated in these Contract Documents.
28
29 a. Prepare a list of items to be completed and corrected (punch list), the value of items on
30 the list, and reasons why the Work is not complete.
31
32 3. Submit statement showing accounting of changes to the Contract Sum.
33
34 4. Advise Owner of pending insurance change over requirements.
35
36 5. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final
37 certifications and similar documents.
38
39 6. All fire sprinklers, devices, alarm system, roofing system, doors, insulation, etc. requiring FM
40 Research approval to submit certification from Factory Mutual.
41
42 7. Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to
43 services and utilities, including occupancy permits, operating certificates, and similar releases.
44
45 8. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner obtaining
46 a signed receipt of materials delivered. Refer to individual work sections for required quantities of
47 spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical
48 units to be submitted.
49
50 9. Complete start up testing of systems, and instructions of Owner's operating/maintenance personnel.
51 Discontinue, or change over, and remove from project site temporary facilities and services, along
52 with construction tools and facilities, mockups, and similar elements.
53
54 10. Complete final clean up requirements.
55
56 11. Touch up and otherwise repair and restore marred exposed finishes.
57
58 12. Inspection: Submit a written request for inspection for Substantial Completion to Project
59 Manager. On receipt of request, Architect and Project Manager will either proceed with inspection
60 or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of
61 Substantial Completion after inspection, the Project Manager will notify Contractor of items, either
62 on Contractor's list or additional items identified by Architect that must be completed or corrected
63 before certificate will be issued.

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1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. 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 reinspections. 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 punchlist 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

- 1 and the Owner.
- 2 11. Revise and submit evidence of final, continuing insurance coverage complying with insurance
- 3 requirements.
- 4 12. A letter from the Owner's representative certifying that he has been properly instructed in the
- 5 operation and maintenance of equipment by the Contractor.
- 6 13. 10% one year Maintenance Bond.
- 7 14. Underwriter's Certificate or Electrical Sub Code Official's Approval.
- 8 15. Fire Alarm Certification and Description - NFPA form 72C including local County of Chester.
- 9 16. HVAC Contractor to submit certified balancing report.
- 10 17. Final acceptance by Architect of record documents
- 11
- 12 B. Except as otherwise indicated or requested by Project Manager/Architect, remove temporary protection
- 13 devices and facilities that were installed during course of the work to protect previously completed work
- 14 during remainder of construction period.
- 15
- 16 1.04 CLEAN UP
- 17
- 18 A. Remove waste materials from site and dispose of in a lawful manner.
- 19
- 20 PART 2 - PRODUCTS
- 21
- 22 NOT APPLICABLE
- 23
- 24 PART 3 - EXECUTION
- 25
- 26 3.01 CLEANING
- 27
- 28 A. Where extra materials of value remaining after completion of associated work have become Owner's
- 29 property, dispose of these to Owner's best advantage as directed.
- 30
- 31 B. After Substantial Completion of the Work, each Contractor shall do the final cleaning of the surfaces of
- 32 his installations as may be required by the various Specification sections.
- 33
- 34 C. After each Contractor has cleaned their work, The General Contractor shall engage a professional
- 35 cleaning service to perform final cleaning of the work consisting of cleaning each surface or unit to
- 36 normal clean condition. Comply with manufacturer's instructions for cleaning operations and chemicals.
- 37 The following are examples, but not by way of limitation, of cleaning levels required:
- 38
- 39 1. Remove labels that are not required as permanent labels.
- 40 2. Clean transparent materials, including mirrors and window/door glass, to a polished condition,
- 41 removing substances that are noticeable as vision obscuring materials. Replace broken glass and
- 42 damaged transparent materials.
- 43
- 44 3. Clean exposed exterior and interior hard surfaced finishes, to a dirt free condition, free of dust,
- 45 stains, films and similar noticeable distracting substances. Except as otherwise indicated, avoid
- 46 disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original
- 47 reflective conditions.
- 48 4. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and
- 49 similar equipment; remove excess lubrication and other substances.
- 50 5. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts,
- 51 trenches, equipment vaults, manholes, attics and similar spaces.
- 52 6. Vacuum and clean carpeted surfaces and similar soft surfaces.
- 53 7. Clean light fixtures and lamps to function with full efficiency.
- 54 8. Clean and wax or polish all hard floors following manufacturer's instructions.
- 55 9. Clean all window surfaces inside and outside.

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

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

26
27 3.02 RECORD DOCUMENTS (Refer to Section 01340, project requirements for submitting Record
28 Documents)

29
30
31 3.03 REMOVE TEMPORARY FACILITIES

- 32
33 A. At the completion of the work prior to final payment, remove all temporary facilities entirely from site,
34 including, but not limited to, the following: Field offices, trailers, shanties, sheds, job telephone,
35 temporary toilets, temporary enclosures, dust barriers and other temporary protection devices.

36
37 **END OF SECTION 01330**

1 **SECTION 01340 - PROJECT RECORD DOCUMENTS**

2
3 PART 1 - GENERAL

4
5 1.01 SUMMARY

6
7 A. Section Includes:

- 8
9 1. Project record documents consisting of:
10 a. Record drawings.
11 b. Record project manual (specifications).

12
13 1.02 SUBMITTALS

14
15 A. Project Record Documents: Submit after substantial completion, but prior to final completion.

- 16
17 1. Record drawings: Submit in form of opaque prints.
18 a. Sets shall include all drawings, whether changed or not.
19 2. Other record documents: Submit originals or good quality photocopies.
20 3. Each Sub contractor is responsible for their respective trade, record documents and record
21 drawings. Combine with General Contractor record drawing documents for a complete set.
22

23 PART 2 - PRODUCTS

24
25 (NOT USED)

26
27 PART 3 - EXECUTION

28
29 3.01 MAINTENANCE OF PROJECT RECORD DOCUMENTS

- 30
31 A. Do not use record documents of any type for construction purposes.
32
33 B. Maintain record documents in a secure location at the site while providing for access by the contractor
34 and the architect during normal working hours; store in a fire-resistive room or container outside of
35 normal working hours.
36
37 C. Record information as soon as possible after it is obtained.
38
39 D. Assign a person or persons responsible for maintaining record documents.
40
41 E. Record the following types of information on all applicable record documents:
42
43 1. Dimensional changes.
44 2. New and revised details.
45 3. Revisions to electrical circuits.
46 4. Locations of utilities concealed in construction.
47 5. Particulars on concealed products which will not be easy to identify later.
48 6. Changes made by modifications to the contract; note identification numbers if applicable.
49 7. New information which may be useful to the owner, but which was not shown in either the contract
50 documents or submittals.
51

52 3.02 RECORD DRAWINGS

- 53
54 A. Maintain a complete set of opaque prints of the contract drawings, marked to show changes.
55 B. Where the actual work differs from that shown on the drawings, mark this set to show the actual work.

- 1
- 2
- 3 1. Mark location of concealed items before they are covered by other work.
- 4 2. Mark either record contract drawings or shop drawings, whichever are best suited to show the
- 5 change.
- 6 C. When the contractor is required by a provision of a modification to prepare a new drawing, rather than to
- 7 revise existing drawings, obtain instructions from the architect as to the drawing scale and information
- 8 required.
- 9
- 10 D. Keep drawings in labeled, bound sets.
- 11
- 12 1. Mark with red pencil.
- 13 2. Mark work of separate contracts with different colors of pencils.
- 14 3. Incorporate new drawings into existing sets, as they are issued.
- 15
- 16 E. Where record drawings are also required as part of operation and maintenance data submittals, copy
- 17 marks to another opaque print obtained from the architect.
- 18
- 19

20 3.03 RECORD PROJECT MANUAL

- 21
- 22 A. Maintain a complete copy of the project manual, marked to show changes.
- 23
- 24 B. Where the actual work differs from that shown in the project manual, mark the record copy to show the
- 25 actual work.
- 26
- 27 1. Include a copy of each addendum and modification to the contract.
- 28 2. In addition to the types of information required on all record documents, record the following
- 29 types of information:
- 30 a. Product options taken, when the specification allows more than one.
- 31 b. Proprietary name and model number of actual products furnished, for each product,
- 32 material, and item of equipment specified.
- 33 c. Name of the supplier and installer, for each product for which neither a product data
- 34 submittal nor a maintenance data submittal was specified.
- 35

36 3.04 TRANSMITTAL TO OWNER (through the Architect)

- 37
- 38 A. Collect, organize, label, and package ready for reference.
- 39
- 40 1. Bind print sets with durable paper covers.
- 41 2. Label each document (and each sheet of drawings) with "PROJECT RECORD DOCUMENTS -
- 42 This document has been prepared using information furnished by _____" [insert the contractor's
- 43 name], and the date of preparation.
- 44
- 45 B. Submit to the Project Manager for transmittal to the Architect, unless otherwise indicated.
- 46
- 47 C. Submit to the Architect four (4) sets of Operation and Maintenance Manuals in three-ring binders, by
- 48 volume, and indexed per binder (with one master index) to be transmitted to the Architect/Engineer for
- 49 approval: All to be submitted at one time, not piece meal. Indexing should follow the specification
- 50 section numbers.
- 51
- 52 • Include all inspection/approvals/certifications
- 53 • All approved submittals and cut sheets as well as manufacturer's operation and maintenance manuals
- 54 for each section.

- 1 • Manuals are to be completed in volumes, three ring binders, starting with Division 1 and continuing
- 2 through the last projects Division. The number of volumes is determined by the number of spec
- 3 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.
- 5

6 **END OF SECTION 01340**

1 **SECTION 01524 – CONSTRUCTION WASTE MANAGEMENT**

2
3 PART 1 – GENERAL

4
5 1.1 RELATED DOCUMENTS

- 6
7 A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and
8 Division 1 Specification Sections, apply to this Section.
9

10 1.2 SUMMARY

- 11
12 A. This Section includes administrative and procedural requirements for the following:

- 13
14 1. Salvaging nonhazardous demolition and construction waste.
15 2. Recycling nonhazardous demolition and construction waste.
16 3. Disposing of nonhazardous demolition and construction waste.
17

- 18 B. Related Sections include the following:

- 19
20 1. All of Division 1 and attached specifications and drawings that make a part of this contract.
21
22

23 1.3 DEFINITIONS

- 24
25 A. Construction Waste: Building and site improvement materials and other solid waste resulting from
26 construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
27

- 28 B. Demolition Waste: Building and site improvement materials resulting from demolition or selective
29 demolition operations.
30

- 31 C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or
32 deposit in landfill or incinerator acceptable to authorities having jurisdiction.
33

- 34 D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
35

- 36 E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
37

38 1.4 SUBMITTALS

- 39
40 A. Waste Management Plan: Submit 4 copies of plan within 30 days of date established for the Notice to
41 Proceed.
42

- 43 B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and
44 organizations. Indicate whether organization is tax exempt.
45

- 46 C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and
47 organizations. Indicate whether organization is tax exempt.
48

- 49 D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by
50 recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and
51 invoices.
52

- 53 E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and
54 incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
55

1
2
3 1.5 QUALITY ASSURANCE
4

- 5 A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
6
7 B. Waste Management Conference: Conduct conference at Project site to comply with requirements in
8 Division 1. Review methods and procedures related to waste management including, but not limited to, the
9 following:
10
11 1. Review and discuss waste management plan.
12 2. Review requirements for documenting quantities of each type of waste and its disposition.
13 3. Review and finalize procedures for materials separation and verify availability of containers and bins
14 needed to avoid delays.
15 4. Review procedures for periodic waste collection and transportation to recycling and disposal
16 facilities.
17 5. Review waste management requirements for each trade.
18

19 1.6 WASTE MANAGEMENT PLAN
20

- 21 A. General: Develop plan consisting of waste identification, and waste reduction work plan. Indicate
22 quantities by weight or volume, but use same units of measure throughout waste management plan.
23
24 B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction
25 waste generated by the Work. Include estimated quantities and assumptions for estimates.
26
27 C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed
28 of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste,
29 quantity for each means of recovery, and handling and transportation procedures.
30
31 1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include
32 list of their names, addresses, and telephone numbers.
33 2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations,
34 include list of their names, addresses, and telephone numbers.
35 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials
36 each will accept. Include names, addresses, and telephone numbers.
37 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address,
38 and telephone number of each landfill and incinerator facility.
39 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable
40 waste including sizes of containers, container labeling, and designated location on Project site where
41 materials separation will be located.
42

43 PART 2 - PRODUCTS (Not Used)
44

45 PART 3 – EXECUTION
46

47 3.1 PLAN IMPLEMENTATION
48

- 49 A. General: Implement waste management plan as approved by Project Manager. Provide handling,
50 containers, storage, signage, transportation, and other items as required to implement waste management
51 plan during the entire duration of the Contract.
52
53 1. Comply with Division 1 Section "Temporary Facilities" for operation, termination, and removal
54 requirements.
55

1 B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as
2 appropriate for the Work occurring at Project site.

3
4 1. Distribute waste management plan to entities when they first begin work on-site. Review plan
5 procedures and locations established for salvage, recycling, and disposal.

6
7 C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum
8 interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

9
10 1. Designate and label specific areas on Project site necessary for separating materials that are to be
11 salvaged, recycled, reused, donated, and sold.

12 2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt,
13 environmental protection, and noise control.

14
15 3.2 SALVAGING DEMOLITION WASTE

16
17 A. Salvaged Items for Sale and Donation: Not permitted on Project site.

18
19 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

20
21 A. General: Recycle beverage containers used by on-site workers.

22
23 B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling
24 waste materials shall accrue to the Contractor.

25
26 C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable
27 waste by type at Project site to the maximum extent practical.

28
29 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are
30 removed from Project site. Include list of acceptable and unacceptable materials at each container
31 and bin.

32
33 a. Inspect containers and bins for contamination and remove contaminated materials if found.

34
35 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and
36 shape stockpiles to drain surface water. Cover to prevent windblown dust.

37 3. Stockpile materials away from construction area.

38 4. Store components off the ground and protect from the weather.

39 5. Remove recyclable waste off Owner's property and transport to recycling receiving or processor.

40
41 3.4 RECYCLING DEMOLITION WASTE

42
43 A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

44 B. Concrete: break up and sort rebar as best as possible. Recycle all concrete.

45 C. Recycle all metal products from the building before demolition (aluminum, steel etc)

46 D. Recycle as much product as possible and provide a complete report to TCNJ to confirm the percentage
47 recycled on the project.

48
49 3.5 RECYCLING CONSTRUCTION WASTE

50
51 A. Packaging:

52
53 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

54 2. Polystyrene Packaging: Separate and bag materials.

55 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For

- 1 pallets that remain on-site, break down pallets into component wood pieces and comply with
2 requirements for recycling wood.
- 3 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling
4 wood.
5
- 6 B. Wood Materials:
7
- 8 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
9
- 10 3.6 DISPOSAL OF WASTE
11
- 12 A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste
13 materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities
14 having jurisdiction.
15
- 16 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-
17 site.
18 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
19
- 20 B. Burning: Do not burn waste materials on site.
21
- 22 C. Burying: Do not bury waste materials on site.
23
- 24 D. Disposal: Transport waste materials off Owner's property and legally dispose of them.
25
- 26 E. Washing waste materials into sewers or drains is not permitted.
27
- 28 **END OF SECTION 01524**

SECTION 02411 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.

- B. Related Requirements:

- 1. Division 01 for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.

2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Project Manager of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. Hazardous materials will be removed by Owner before start of the Work.
 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least a half hour after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner, coordinate with owner storage location.
 4. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 07512 for new roofing requirements.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

END OF SECTION 02411

SECTION 03301 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents:
 - 1. "General Requirements."
 - 2. "Formwork and Formwork Accessories."
 - 3. "Reinforcement and Reinforcement Supports."
 - 4. "Concrete Mixtures."
 - 5. "Handling, Placing, and Constructing."
 - 6. "Lightweight Concrete."
- B. Comply with ACI 117 (ACI 117M).

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II.
 - 2. Fly Ash: ASTM C 618, Class C or F.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
 - 4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IS, portland blast-furnace slag cement.
- C. Normal-Weight Aggregate: ASTM C 33/C 33M, 1-1/2-inch nominal maximum aggregate size.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C 94/C 94M.

2.4 RELATED MATERIALS

- A. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 CONCRETE MIXTURES

- A. Comply with ACI 301 (ACI 301M).
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - 4. Slump Limit: 4 inches, plus or minus 1 inch (25 mm).
 - 5. Air Content: Maintain within range permitted by ACI 301 (ACI 301M). Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301 (ACI 301M).

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 301 (ACI 301M) for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
- E. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 4000 psi at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor them into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding 1/2 inch (13 mm).
 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm).
 1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 1. Do not further disturb surfaces before starting finishing operations.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during

finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Tests: Perform according to ACI 301 (ACI 301M).
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

END OF SECTION 03301

SECTION 05120 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Structural steel.
2. Grout.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 3. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 4. Identify demand critical welds.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Survey of existing conditions.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 572/A 572M, Grade 50.
- B. Channels, Angles, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

1. Weight Class: Standard.
2. Finish: Galvanized.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
1. Finish: Hot-dip or mechanically deposited zinc coating.
 2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.
- C. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 (ASTM A 563M) [heavy-]hex carbon steel.
 2. Washers: ASTM A 36/A 36M carbon steel.
 3. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
1. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.

- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
 - 6. Surfaces enclosed in interior construction.
- B. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

- C. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- C. Splice members only where indicated.
- D. Do not use thermal cutting during erection.
- E. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

3.4 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05120

SECTION 05310 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Roof deck.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- B. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 ROOF DECK

- A. Roof Deck: comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G90 zinc coating.
 - 2. Deck Profile: Type B, to match existing (verify in field).
 - 3. Profile Depth: 1-1/2 inches, to match existing (verify in field).
 - 4. Design Uncoated-Steel Thickness: 22 gage minimum.

2.2 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- F. Galvanizing Repair Paint: ASTM A 780/A 780M.
- G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: 5/8 inch, nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
 - 3. Weld Washers: Install weld washers at each weld location.

3.4 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

END OF SECTION 05310

SECTION 06105 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking, cants, and nailers.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater size but less than 5 inches nominal (114 mm actual) size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Power-driven fasteners.
 - 3. Post-installed anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Dress lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 7. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
1. Hem-fir (north); NLGA.
 2. Mixed southern pine or southern pine; SPIB.

3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

- D. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- E. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06105

SECTION 07512 - BUILT-UP COAL TAR PITCH ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

- A. Cold Applied 2-Ply Coal Tar Roofing
- B. Roof Insulation including crickets with base layer attached and subsequent layers adhered.
- C. Cold adhesive for interplay adhesion on all applications
- D. Accessories.
- E. Roof Penetration Flashings.

1.3 RELATED SECTIONS

- A. Section 06114 – Miscellaneous Rough Carpentry.
- B. Section 07620 - Sheet Metal Flashing and Trim.

1.4 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Fire, Wind and Hail Resistance: Provide membrane roofing system with, base flashings, component materials and fastening / adhering methods that have been evaluated and tested by an accredited, independent testing laboratory and meets or exceeds requirements of FM for the following:
 - 1. Fire/Windstorm Classification: Class FM 1-90.
 - 2. Hail Resistance Rating: SH.
- D. Design Requirements:
- E. Wind Load: Roof system installation shall also be in compliance with FM 4450 and FM

4470, U.L. 580, or U.L. The roof system and installation shall meet or exceed requirements for basic wind speed and uplift resistance requirements complying with IBC International Building Code 2009, New Jersey Edition, Section 1609 Wind Loads for peak gust wind speed.

1. Uniform Wind Uplift Load Capacity
 - a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.
 - 1) Design Code: ASCE 7, Method 2 for Components and Cladding.
 - 2) Importance Category:
 - a) III.
 - 3) Importance Factor of:
 - a) 1.0
 - 4) Wind Speed: 120 mph
 - 5) Exposure Category:
 - a) B.
 - 6) Design Roof Height: 22 feet.
2. Snow Load: 25 psf.
3. Roof Live Load: 20 psf, or not to exceed original building design.

F. Weathering: Roof system manufacturer shall demonstrate that roof system installation will be in compliance with ASTM E838, G23, G26 or G53 based on 2,000 hours of exposure to accelerated weathering tests.

G. Impact Resistance: Roof covering shall resist impact damage in conformance with ASTM D3746 or D4272, or CGSB37-52 M or FM 4470.

1. Provide roof covering materials bearing testing laboratory approval marking on bundle, package or container, indicating that material has been subjected to examination and follow-up inspection service.

1.6 SUBMITTALS

- A. Submit under provisions of division 1.
- B. Product Data: For each type of product indicated. Provide manufacturer's technical product data, installation details, for each type of roofing product specified. Submit manufacturer's written installation instructions and recommendations indicating special precautions required for installing the membrane roofing system.
- C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, and insulation, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.
 1. Submit coordination drawings, showing all equipment, equipment curbs, conduits and roof openings.
 2. Show tapered insulation, including slopes, cants and crickets around obstructions to drain
 3. positive drainage source.
 4. Crickets, saddles, and tapered edge strips, including slopes
 5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations
 6. Walkway pads.
 7. Submit evidence of roofing manufacturer's approval for project conditions. Modify details indicated on drawings to comply with manufacturer's requirements and specified performance and warranty requirements

- D. Verification Samples: For each membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Manufacturer's Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article and complies with recognized building codes having jurisdiction at the Project site.
 - 1. Submit evidence of complying with performance requirements.
 - 2. Certify that materials are chemically and physically compatible with each other and are suitable for inclusion within the total roofing system specified herein.
 - 3. Manufacturer certifies that it approves the fasteners to be used based on pull-out tests performed by the roofing system manufacturer on the type of decks included on this project.
 - 4. Certify that shop drawings have been reviewed and comply with manufacturer's requirements and are approved by the manufacturer and prior to submission to Architect.
 - 5. Certify that the manufacturer will issue specified warranty for roofing installation complying with approved shop drawings.
- F. Installer Certificates: Signed by roofing system manufacturer certifying that the Installer is approved, authorized, or licensed by the manufacturer to install the roofing system.
 - 1. Certification that all materials to be furnished for the roofing system comply with the requirements of the specifications, including referenced standards, approved shop drawings, and are compatible one to the other, and are recommended by their respective manufacturer's for their intended use as defined by the Contract Documents, and comply with the roofing membrane manufacturer's warranty/guarantee requirements for specified warranty/guarantee.
- G. Manufacturer's Fire Compliance Certificate: Certify that the roof system furnished is approved by Factory Mutual (FM).
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by the manufacturer and witnessed by a qualified independent testing agency, for components of the membrane roofing system.
- I. Documentation of Existing Conditions: Document existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by re-roofing operations. Submit before work begins. Use high-resolution digital photographs or video by written commentary for preparing reports.
- J. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- K. Work on the roofs shall not begin until submittals have been reviewed, approved and returned to the Contractor by the Owner.
- L. Warranties: Special warranties specified in this Section.
- M. Submit description of manufacturer's field inspection program. Include description of training and experience of Manufacturer's Technical Representatives. Submit written

reports of all inspections and field testing performed and forward copies to the Owner on the same day.

- N. Inspection Reports: Copy of the roofing system manufacturer's inspection report of the completed roofing installation.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Manufacturer Qualifications: A qualified manufacturer that is FM Global approved for built-up roofing identical to that used for this Project. Manufacturer shall have a minimum of ten (10) years of experience in roofing system being installed in addition to submitting evidence of material installed on five (5) roofing projects of similar size located in the Northeast area.
- C. Manufacturer's Technical Representatives: Manufacturer will be one who maintains an in-house technical department with fully qualified Technical Representatives, other than the Installer, and who are available for technical assistance, including field assistance at the project site. This Technical Representative will be required to make all necessary field inspections, and to visit the project on a minimum of five days per week during installation and not less than one final inspection upon completion of the installation to ascertain that the roofing system is being installed in strict compliance with the manufacturer's written specifications and approved shop drawings. Technical Representative will submit written reports of all inspections and field tests performed the same day the inspection is made and that report must be available on-line to authorized users. The daily reports shall:
 - 1. Keep the Project Manager informed as to the progress and quality of work as observed via regular written progress reports and digital photographs available on line through a roof asset data base.
 - 2. Report to the Project Manager in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 3. The Roofing Contractor will be responsible for all costs relating to these services by the Manufacturer's Technical Representative.
- D. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.
- E. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved by roofing manufacturer and that is eligible to receive manufacturer's special warranty.
- F. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.
- G. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.8 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to commencing Work of this section.

- B. Review installation procedures and coordination required with related Work.
 - 1. Identify any equipment that need to be temporarily disconnected for demolition and installation of work as well as duration of outage.
 - 2. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 3. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 4. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 5. Review roofing system requirements (drawings, specifications and other contract documents).
 - 6. Review required submittals both completed and yet to be completed.
 - 7. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 8. Review required inspection, testing, certifying and material usage accounting procedures.
 - 9. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 - 10. Review temporary protection requirements for roofing during and after installation
 - 11. Review notification procedures for weather or non-working days.
- C. Inspect and make notes of job conditions prior to installation:
 - 1. Record minutes of the conference and provide copies to all parties present.
 - 2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
 - 3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to prevent moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- E. Roof membrane material, adhesives and other combustible materials shall not be stored in

the building during construction.

- F. Handle and store roofing materials and place equipment in a manner to avoid causing overstressing of roof decks and supporting structure and causing permanent deflection of deck.
- G. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
 - 1. Secure all material and equipment on the job site, if any material equipment is stored on the roof, to assure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the Contractor's actions will be the sole responsibility of the Contractor and will be repaired or replaced at his expense.
- H. Do not stockpile materials on roofs.
- I. Fire extinguishers shall be present on the roof within easy access on the roof during installation, and when kettles, power tools, flammable adhesives, materials and cleaning agents shall be handled in such a manner to minimize the risk of fire.

1.10 COORDINATION

- A. Coordinate Work with installing associated metal flashings as work of this section proceeds.
- B. Coordinate work with existing and proposed roof mounted equipment.

1.11 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements. Do not work in rain, snow or in the presence of water.
- C. Do not apply roofing insulation or membrane to damp deck surface.
- D. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.
- E. All slopes greater than 1-1/2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral shank one (1) inch cap nails, or screws and plates at the rate of one (1) fastener per ply (including the modified membrane) at each insulation stop. Place insulation stops at 16 feet on center for slopes less than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 1-1/2:12, install all plies parallel to the slope (strapping) to facilitate back-nailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.
- F. Owner will occupy portions of building immediately below re-roofing area. Conduct re-roofing so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
- G. Coordinate work activities daily with Owner so Owner implement protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or-

detection equipment if needed, and evacuate occupants from below the work area.

- H. Before working over structurally-impaired areas of deck, notify Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated prior to proceeding with work over the impaired deck area.
- I. Protect building to be re-roofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from re-roofing operations.
- J. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- K. Owner assumes no responsibility for condition of areas to be re-roofed. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.

1.12 WARRANTY

- 1.13 The Roofing Installer shall furnish Owner with a Two (2) Year Contractor's Labor Warranty from Date of Final Acceptance covering all labor and material costs to repair defects, leaks, etc. occurring in the roofing system during that period. Warranty shall cover the complete roofing system including, but not limited to, all components of membrane roofing system such as membrane roofing, base sheets, base flashing, adhesives roof insulation, fasteners, cover boards, substrate boards, blocking, metal flashings, fascia and roof edge metal, walkway products, and other components of the membrane roofing system, from top of roof deck and up.
- 1.14 The Roofing System Manufacturer shall furnish the Owner with a Manufacturer's Twenty (20) Year NDL (No Dollar Limit Warranty) Total Roofing System Warranty from date of final acceptance including all labor and material costs to repair defects, leaks, etc. occurring in roofing system including, but not limited to, all components of membrane roofing system such as membrane roofing, base sheets, base flashing, asphalts and/or adhesives roof insulation, fasteners, cover boards, substrate boards, blocking, metal flashings, fascia and roof edge metal, walkway products, and other components of the membrane roofing system, from top of roof deck and up

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design: Specifications are based on product identified herein by manufacturer's name and model to establish acceptable standards of quality, performance, features, and construction.
 - 1. Garland Company, Inc. (The); 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: www.garlandco.com
- B. Other manufacturers: Contingent upon compliance with these specifications and documentation requirements set forth in SUBMITTALS, other manufacturers may be considered.
- C. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.
 - 1. Bidder will not be allowed to change materials after the bid opening date.

2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/Owner for approval prior to acceptance.
3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:
 - a. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.
 - b. Will provide the same guarantee for substitution as for the product and method specified.
 - c. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.
 - d. Will waive all claims for additional cost related to substitution, which consequently become apparent.
 - e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.
 - f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution
4. Failure to submit substitution package, or any portion thereof requested, will result in immediate disqualification and consideration for that particular contractors request for manufacturer substitution.

2.2 SYSTEM DESCRIPTION GENERAL

- A. Tow Ply Coal Tar Pitch roofing work including but not limited to:
 1. Tear off the existing roof systems down to the deck. Clean and make repairs to the deck.
 2. Roof Insulation: Install 1" of polyisocyanurate insulation over the prepared substrate.
 3. Install crickets and tapered insulation as shown including dimensions.
 4. Over lay the insulation with ½" recovery board.
 5. Install one ply of base sheet bonded to the prepared substrate with cold applied adhesive.
 6. Install Base Flashing Ply set in cold apply adhesive.
 7. Install Cap sheet set in cold applied adhesive over all field and flashing plies.

2.3 SHEET MATERIALS

- A. Base (Ply) Sheet:
 1. Millennium Base: 80 mil SBS (Styrene-Butadiene-Styrene) polymer modified coal tar base sheet utilizing polyester and fiberglass reinforcement by Garland or approved equal.
 - a. Tensile Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
 - b. Tear Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
 - c. Elongation at Maximum Tensile, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 8%
 - d. Low Temperature Flexibility, ASTM D 5147, Passes -76 deg. F (-60 deg. C)
- B. Thermoplastic/Modified Cap (Ply) Sheet:
 1. Millennium Mineral: 160 mil SBS (Styrene-Butadiene-Styrene) Mineral Surfaced Coal Tar polymer modified coal tar membrane utilizing polyester and fiberglass reinforcement by Garland or approved equal.

- a. Tensile Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
 - b. Tear Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
 - c. Elongation at Maximum Tensile, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 3.5% XD 3.5%
 - d. Low Temperature Flexibility, ASTM D 5147, Passes -76 deg. F (-60 deg. C)
- C. Flashing Base Ply:
1. Millennium Base: 80 mil SBS (Styrene-Butadiene-Styrene) polymer modified coal tar base sheet utilizing polyester and fiberglass reinforcement by Garland or approved equal.
 - a. Tensile Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
 - b. Tear Strength, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
 - c. Elongation at Maximum Tensile, ASTM D 5147
 - 1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 8%
 - d. Low Temperature Flexibility, ASTM D 5147
 - 1) Passes -76 deg. F (-60 deg. C)
 2. Flashing Cap (Ply) Sheet:
 - a. Millennium Mineral: 160 mil SBS (Styrene-Butadiene-Styrene) Mineral Surfaced Coal Tar polymer modified coal tar membrane utilizing polyester and fiberglass reinforcement Garland or approved equal.
 - 1) Tensile Strength, ASTM D 5147
 - a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 310 lbf/in XD 310 lbf/in
 - 2) Tear Strength, ASTM D 5147
 - a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 500 lbf XD 500 lbf
 - 3) Elongation at Maximum Tensile, ASTM D 5147
 - a) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 3.5% XD 3.5%
 - 4) Low Temperature Flexibility, ASTM D 5147, Passes -76 deg. F (-60 deg.

2.1 COLD APPLIED ADHESIVE

- A. Interply Adhesive: Black-Knight/Black-Stallion Cold by Garland or approved equal
1. Rubberized, polymer modified cold process coal tar roofing bitumen:
 - a. Non-Volatile Content ASTM D 4479 77%
 - b. Density ASTM D1475 9.4lb./gal.
 - c. Flash Point: 105°F (41°C)
 - d. Viscosity (cps): 120,000
 - e. Solids Content: 89%vol
- B. Flashing Adhesive: Green Lock Flashing Adhesive by Garland or approved equal. Cold applied, zero VOC, 100% polyether moisture-cured flashing adhesive.

2.2 BITUMEN MATERIALS

- A. Coal-Tar Pitch: ASTM D 450, Type I.

2.3 RECOVER BOARDS

- A. Recover Board: ASTM C1177/C 1177M, glass-mat, water-resistant gypsum substrate; 1/2 inch thick.
- B. Available Manufacturer:
 - a. DensDeck by Georgia - Pacific Roof Board
 - b. Approved equal

2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
- B. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up base flashings.
- C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening built-up roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.
- E. Metal Termination Bars: Roofing manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- F. Walkway Pads: Slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to built-up roofing manufacturer, 1/2-inch-thick, minimum.
- G. Pad Size: 30" wide x 1/2" thick
- H. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class I, Grade 3, felt or glass-fiber mat facer on both major surfaces.
 - 1. Insulation board shall comply with FM Class 1 and UL Class A ratings and contain no CFC's and no HCFC's, Flame spread 0-75 (ASTM E84). Insulation shall be a minimum 1/2" thick for tapered applications with a minimum "R" value of 6, and 1" minimum for non-tapered application with a minimum "R" value of 8. Tapered roof insulation shall not be lower than 1/2" at the roof drains. Tapered insulation shall be custom fitted for crickets that taper from roof edge and ridge points to roof drains.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- C. Wood Nailer Strips: Comply with requirements in Section." Section 06105 "Miscellaneous Rough Carpentry."
- D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- E. Substrate Joint Tape: 6- or 8-inch- (150- or 200-mm-) wide, coated, glass fiber.

2.7 ROOF PENETRATION FLASHINGS

- A. Flashing Boot - Rubbertite Flashing Boot: Neoprene pipe boot for sealing single or multiple pipe penetrations adhered in approved adhesives as recommended and furnished by the membrane manufacturer.
- B. Pitch pans, Rain Collar 24 gauge stainless. All joints should be welded/soldered watertight. See details for design.
- C. Drain Flashings should be 4lb (1.8kg) sheet lead formed and rolled.
- D. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.
- E. Fabricated Flashings: Fabricated flashings and trim are specified in Section 07620.
 - 1. Fabricated flashings and trim shall conform to the detail requirements of SMACNA "Architectural Sheet Metal Manual" and/or the CDA Copper Development Association "Copper in Architecture - Handbook" as applicable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Installer shall verify soundness and condition of existing roof decks. Should defective areas be encountered, Installer shall immediately notify the Project Manager in writing of conditions detrimental to the safe, proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Install charcoal air filter at all existing air intakes in accordance with the filter manufacturer's instructions. Install prior to start of any work.
- C. Remove all roofing, insulation, rotten nailers, blocking, cants, copings, flashings, gravel stops, and related work, etc., to original structural roof deck.
- D. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
- E. Verify that roof openings and penetrations are in place and curbs, pipes, conduit sleeves, ducts and other items which penetrate the roof area are set and braced and that roof drain bodies are securely clamped in place.
- F. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at

penetrations and terminations and that nailers match thicknesses of insulation.

- G. Verify deck surfaces are clean, smooth, free of defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
- H. Proceed with installation only after unsatisfactory conditions have been corrected.
- I. Do not begin installation until substrates have been properly prepared.
- J. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.
- K. If substrate preparation and other conditions are the responsibility of another installer, notify Project Manager of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. General: Clean surfaces thoroughly prior to installation.
 - 1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.
 - 3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.
 - 4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.
 - 5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.
- B. Coordinate with Owner to shut down air intake equipment in the vicinity of the Work. Cover air intake louvers before proceeding with re-roofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- C. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
- E. If roof drains will be temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
- F. Verify that rooftop utilities and service piping have been shut off before commencing Work.
- G. Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that cant strips, nailing strips, and reglets are set in place.

3.3 ROOFING DEMOLITION

- A. General: Notify Owner each day of extent of roof tear-off proposed.
- B. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
- C. Remove excess asphalt from steel deck (Deck shall meet FM requirements).
- D. Remove any fasteners from deck.
- E. Follow all OSHA requirements in terms of perimeter safety requirements, flagging and warning systems.
- F. All debris is to be removed from the roof via an enclosed chute. No debris may be thrown freely into the dumpsters. Protect the building where off loading is to take place. Full dumpsters are to be removed from the site on a daily basis.

3.4 DECK PREPARATION

- A. Inspect deck after tear-off of membrane roofing system.
- B. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Engineer. Do not proceed with installation until directed by Engineer.
- C. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Engineer. Do not proceed with installation until directed by Engineer.
- D. Metal Deck: Metal deck shall be installed as specified
 - 1. When re-roofing over steel decks, surface corrosion shall be removed, and repairs to severely corroded areas made. Loose or inadequately secured decking shall be fastened, and irreparable or otherwise defective decking shall be replaced.

3.5 INSTALLATION - GENERAL

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Coordinate installation of roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of #15 organic roofing felt set in full moppings of bitumen and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work
- C. Install roofing membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.
- D. Install roofing membranes and flashings in accordance with FM Approvals' "RoofNav":
 - 1. The following information is for basis of design
 - a. assembly # 263182-233348

- b. Roof System: Multi-Ply system
- c. Config: B1-P0-C1
- 2. Prescriptive enhancements may be used for the corner areas in accordance with FM Global Property Loss Prevention Data Sheet 1-29, *Roof Deck Securement and Above-Deck Roof Components*.
- E. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water
- F. Coordinate with roofing manufacturer minimum slope which will require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop.
 - 1. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.6 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions and approved shop drawings for installing roof insulation.
- C. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees. Use urethane insulation adhesive to adhere fiberglass cant strip on the 2:12 roof section installed over the recovery board.
- D. Install tapered insulation under area of roofing to conform to slopes indicated and in accordance with approved shop drawings.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- F. Trim surface of insulation where necessary at roof drains to form a 30-inch square sump sloping downward so completed surface is flush with ring of drain and does not restrict flow of water.
- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Adhered Insulation: Install first layer of insulation to deck using adhesive specifically designed for fastening specified board-type roof insulation to deck type. (adhere all remaining layers).
 - 1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Subsequent layers of insulation to be adhered with manufacture's urethane adhesive for the cold systems.

- I. Install recovery boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of 6 inches (150 mm) in each direction from joints of insulation below. Loosely butt recovery boards together (and adhere to insulation). Tape joints if required by roofing system manufacturer.
- J. Secure tapered fiberboard and cant strips to recovery board below.

3.7 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
- B. SMACNA and NRCA Details: Conform work with details shown on approved shop drawings, and with fabrication requirements of "Architectural Sheet Metal Manual" by SMACNA. Comply with installation details of "Roofing and Waterproofing Manual" by NRCA.
- C. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- D. Where roof slope exceeds 1/2 inch per 12 inches (1:24), install roofing membrane sheets parallel with slope. Backnail roofing membrane sheets to nailer strips and/or substrate according to roofing system manufacturer's written instructions and as follows.
- E. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
- F. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - 1. At end of each day's work, provide cut-offs to cover and protect incomplete and exposed roofing membrane sheets and insulation with two plies of #15 organic roofing felt set in adhesive with joints and edges sealed, or other tie-in detail jointly agreed upon in writing. Remove cut-offs immediately before resuming work.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- G. Coal Tar Pitch Mopping Rates:
 - 1. Interplay Mopping: Apply bitumen at the rate of approximately twenty-five (25) lb. (11.3 kg) of bitumen per roof square.
 - 2. Modified Membrane Mopping: Apply bitumen at the rate of approximately thirty (30) lb (13.6 kg) of bitumen per roof square.
 - 3. Flood Coat: Apply bitumen at the rate of approximately seventy (70) lb. (31 kg) of bitumen per square (plus or minus twenty-five (25) percent on a total job average basis).

3.8 INSTALLATION COLD APPLIED ROOF SYSTEM

- A. Base Ply: Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.

1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
 2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
 3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.
 4. Install subsequent rolls of modified across the roof as above with a minimum of 4-inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
 5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.
 6. Install base flashing ply to all perimeter and projection details.
 7. Allow the one ply of base sheet to cure per manufacturer recommendation before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.
- B. Modified Cap Ply(s): Install in interply adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.
1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.
 2. Solidly bond to the base layers with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.
 3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Care should be taken to eliminate air entrapment under the membrane.
 4. Install subsequent rolls of modified across the roof as above with a minimum of 4-inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.
 5. Allow cold adhesive to set per manufacturer recommendations before installing the top layer of modified membrane.
 6. Extend membrane 2 inches beyond top edge of all cants in full moppings of the cold adhesive as shown on the Drawings.
- C. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 06105.
1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.
 2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.
 3. Nailer lengths should be spaced with a minimum 1/8-inch gap for expansion and contraction between each length or change of direction.
 4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.
- D. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
 2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer

- to dry tack free.
3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
 4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.
 5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.
 6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
 7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.
 8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.
- E. Flashing Cap Ply: Install flashing cap sheets by the same application method used for the base ply.
1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
 2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
 3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.
 4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.
 5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.
 6. All stripping shall be installed prior to flashing cap sheet installation.
 7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.
 8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed, or nailed 4 inches on center and covered with an acceptable counter flashing.
- F. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.9 INSTALLATION ROOF PENETRATION FLASHING

- A. Scupper Through Wall:
1. Inspect the nailer to assure proper attachment and configuration.
 2. Run one ply over nailer, into scupper hole and up flashing as in typical wall flashing detail. Assure coverage of all wood nailers.
 3. Install a scupper box in a 1/4 inch (6 mm) bed of mastic. Assure all box seams are soldered and have a minimum 4 inch (101 mm) flange. Make sure all corners are closed and soldered. Prime scupper at a rate of 100 square feet per gallon and allow to dry.
 4. Fasten flange of scupper box every 3 inches (76 mm) o.c. staggered.

5. Strip in flange of scupper box with base flashing ply covering entire area with 6 inch (152 mm) overlap on to the field of the roof and wall flashing.
 6. Install a second ply of modified flashing ply in adhesive over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all seams.
- B. Surface Mounted Counterflashing:
1. Minimum flashing height is 8 inches (203 mm) above finished roof height. Maximum flashing height is 24 inches (609 mm). Prime vertical wall at a rate of 100 square feet per gallon and allow to dry.
 2. Set cant in adhesive. Run all field plies over cant a minimum of 2 inches (50 mm).
 3. Install base flashing ply covering wall set in adhesive with 6 inches (152 mm) on to field of the roof.
 4. Install a second ply of modified flashing ply in adhesive over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
 5. Apply butyl tape to wall behind flashing. Secure termination bar through flashing, butyl tape and into wall. Alternatively use caulk to replace the butyl tape.
 6. Secure counterflashing set on butyl tape above flashing at 8 inches (203 mm) o.c. and caulk top of counterflashing.
- C. Curb Detail/Air Handling Station:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
 2. Set cant in adhesive. Run all field plies over cant a minimum of 2 inches (50 mm).
 3. Install base flashing ply covering curb set in adhesive with 6 inches (152 mm) on to field of the roof.
 4. Install a second ply of modified flashing ply in adhesive over the base flashing ply, 9 inches (228 mm) on to the field of the roof. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
 5. Install pre-manufactured counterflashing with fasteners and neoprene washers or per manufacturer's recommendations.
 6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- D. Pre-manufactured Curb For Equipment Support:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
 2. Run all field plies over cant of the pre-manufactured equipment support a minimum of 2 inches.
 3. Install base flashing ply covering pre-manufactured curb with 6 inches (152 mm) on to field of the roof.
 4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
 5. Install pre-manufactured cover. Fasten sides at 24 inches (609 mm) o.c. with fasteners and neoprene washers. Furnish all joint cover laps with butyl tape between metal covers.
 6. Set equipment on neoprene pad and fasten as required by equipment manufacturer.
- E. Exhaust Fan:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical

- at a rate of 100 square feet per gallon and allow to dry.
2. Set cant in adhesive. Run all plies over cant a minimum of 2 inches (50 mm).
 3. Install base flashing ply covering curb with 6 inches (152 mm) on to field of the roof.
 4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
 5. Install metal exhaust fan over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendation.
- F. Passive Vent/Air Intake:
1. Minimum curb height is 8 inches (203 mm) above finished roof height. Prime vertical at a rate of 100 square feet per gallon and allow to dry.
 2. Set cant in adhesive. Run all plies over cant a minimum of 2 inches (50 mm).
 3. Install base flashing ply covering curb with 6 inches (152mm) on to the field of the roof.
 4. Install a second ply of modified flashing ply installed over the base flashing ply, 9 inches (228 mm) on to field of the roof. Attach top of membrane to top of wood curb and nail at 8 inches (203 mm) o.c. Apply a three-course application of mastic and mesh at all vertical seams and allow to cure and aluminize.
 5. Install passive vent/air intake over the wood nailers and flashing to act as counterflashing. Fasten per manufacturer's recommendations.
- G. Roof Drain:
1. Plug drain to prevent debris from entering plumbing.
 2. Taper insulation to drain minimum of 24 inches (609 mm) from center of drain.
 3. Run roof system plies over drain. Cut out plies inside drain bowl.
 4. Set lead/copper flashing (30 inch square minimum) in 1/4 inch bed of mastic. Run lead/copper into drain a minimum of 2 inches (50 mm). Prime lead/copper at a rate of 100 square feet per gallon and allow to dry.
 5. Install base flashing ply (40 inch square minimum) in adhesive.
 6. Install modified membrane (48 inch square minimum) in adhesive.
 7. Install clamping ring and assure that all plies are under the clamping ring.
 8. Remove drain plug and install strainer.
- H. Plumbing Stack:
1. Minimum stack height is 12 inches (609 mm).
 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
 3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
 4. Install base flashing ply in adhesive.
 5. Install membrane in adhesive.
 6. Caulk the intersection of the membrane with elastomeric sealant.
 7. Turn sleeve a minimum of 1 inch (25 mm) down inside of stack.
- I. Pitch Pocket:
1. Run all plies up to the penetration.
 2. Place the pitch pocket over the penetration and prime all flanges.
 3. Strip in flange of pitch pocket with one (1) ply of base flashing ply. Extend six (6) inches onto field of roof.
 4. Install second layer of modified membrane extending nine (9) inches onto field of the

- roof.
- 5. Fill pitch pocket half full with non-shrink grout. Let this cure and top off with pourable sealant.
- 6. Caulk joint between roof system and pitch pocket with roof cement.

J. Heat Stack:

- 1. Minimum stack height is 12 inches (609 mm).
- 2. Run roof system over the entire surface of the roof. Seal the base of the stack with elastomeric sealant.
- 3. Prime flange of new sleeve. Install properly sized sleeves set in 1/4 inch (6 mm) bed of roof cement.
- 4. Install base flashing ply in adhesive.
- 5. Install modified membrane in adhesive.
- 6. Caulk the intersection of the membrane with elastomeric sealant.
- 7. Install new collar over cape. Weld collar or install stainless steel draw brand.

3.10 FIELD QUALITY CONTROL

- A. Perform regular field inspections as required.
- B. Correct defects or irregularities discovered during field inspections and the manufacturer's pre-surfacing inspection.

3.11 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Engineer and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Remove adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- D. In areas where finished surfaces are soiled by adhesive or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.
- E. Repair or replace defaced or disfigured finishes caused by work of this section.
- F. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- G. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

3.12 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during maintenance procedures. Comply with requirements of authorities having jurisdiction.

3.13 PROTECTION

- A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles and utilities.
- B. Protect exposed surfaces of finished walls with tarps to prevent damage.
- C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.
- D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.
- E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.14 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Engineer, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the roof system installer as part of the base bid.
- D. If presence of damp or wet materials, the roof system installer shall be required to replace the damaged areas at his own expense.
- E. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Notify the Owner upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.

END OF SECTION

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SECTION 07620 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing with counterflashing.
2. Manufactured reglets with counterflashing.
3. Formed equipment support flashing.
4. Formed overhead-piping safety pans.
5. Scuppers and trim.

B. Related Requirements:

1. Section 06105 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07550 "Coal Tar Built-Up Membrane Roofing".

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (galvannealed) by the Hot-Dip Process.
2. ASTM A792 Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process.
3. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
5. ASTM D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.

B. Factory Mutual Research Corporation (FMRC)

C. Underwriters Laboratories (UL)

D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

1. Architectural Sheet Metal Manual

E. National Roofing Contractors Association (NRCA)

1. Roofing and Waterproofing Manual

- F. American Society of Civil Engineers (ASCE)
- G. ASCE 7 Minimum Design Loads for Buildings and Other Structures

1.4 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.
- C. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for pre-formed metal edge system

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.
 - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 - 8. Include details of roof-penetration flashing.
 - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 10. Include details of special conditions.
 - 11. Include details of connections to adjoining work.
- C. Samples: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is FM Approvals approved.

- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
 - 1. Independent laboratory testing report for system design load and seam integrity.
 - 2. Professional engineer's documentation that system incorporates sufficient allowance for stress and movement.
 - 3. A letter from an officer of the manufacturing company certifying that the materials furnished for this project are the same as represented in tests and supporting data.
 - 4. Manufacturer's verifications that the panels are factory roll-formed.
 - 5. UL 1897: Test report must be submitted for windstorm rating no less than that specified in Design and Performance Criteria article. The proposed roof system must have approval over specified substrate with steel framing spaced no further apart than as specified.
- D. Mill production reports certifying that the steel thicknesses are within allowable tolerances of the nominal or minimum thickness or gauge specified.
- E. Certifications:
- F. Submit roof manufacturer's certification that metal fasteners furnished are acceptable to roof manufacturer.
- G. Submit roof manufacturer's certification that metal furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty
- H. Sample Warranty: For special warranty, identifying the terms and conditions required of the Manufacturer and the Owner

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance with a minimum of five (5) years' experience.
- B. Maintain a full-time supervisor/foreman who is on the job-site at all times during installation. Foreman must have a minimum of five (5) years experience with the installation of similar system to that specified.

- C. Source Limitation: Obtain components from a single manufacturer. Secondary products which cannot be supplied by the specified manufacturer shall be approved in writing by the primary manufacturer prior to bidding.
- D. Upon request fabricator/installer shall submit work experience and evidence of financial responsibility. The Owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- C. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Owner shall receive one (1) warranty from manufacturer of roofing materials covering all of the following criteria. Multiple warranties are not acceptable.
 - 1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fade, chalking and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D-2244 or chalking excess of 8 units per ASTM D-659. If either occurs material shall be replaced per warranty, at no cost to the Owner.
 - 2. Changes: Changes or alterations in the edge metal system without prior written consent from the manufacturer shall render the system unacceptable for warranty(ies).
 - 3. Warranty shall commence on date of substantial completion or final payment, whichever is agreed by contract.
 - 4. The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be watertight and secure for a period of two years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.
 - 5. Installing roofing contractor shall be responsible for the installation of the edge metal system in general accordance with the membrane manufacturer's recommendations.
 - 6. Installing contractor shall certify that the edge metal system has been installed per the manufacturer's printed details and specifications.
 - 7. One manufacturer shall provide a single warranty for all accessory metal for flashings, metal edges and copings, along with the warranty for metal roof areas, membrane roof areas, and any transitions between two different material types.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-105. Identify materials with name of fabricator and design approved by FM Approvals.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
- C. Finish: Shall be Kynar 500
 - 1. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: As selected by Owner from manufacturer's full range.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 4 (polished directional satin).
- E. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: As selected by Owner from manufacturer's full range.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
 5. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 1. Material: Aluminum, 0.032-inch-thick minimum.
 2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 4. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.

3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
- B. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
- C. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch thick.
 2. Galvanized Steel: 0.028 inch thick.

- D. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.
 - 2. Galvanized Steel:[0.028 inch thick.
- B. Overhead-Piping Safety Pans: Fabricate from the following materials:
 - 1. Stainless Steel: 0.025 inch thick.
 - 2. Galvanized Steel: 0.040 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Apply slip sheet, where manufacturer recommends, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws and as recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
 2. Do not use torches for soldering.

3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07620

SECTION 232213 – PIPING AND VALVES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes low pressure natural gas, high pressure steam, boiler feedwater, continuous blowdown, intermittent blowdown and steam condensate piping and specialties.

1.3 SUBMITTALS

- A. Product Data: For each type of special-duty valve and steam trap indicated, including rated capacities and accessories.
- B. Delegated-Design Submittal:
 - 1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure, as required.
 - 2. Locations of pipe anchors and alignment guides and expansion joints and loops, as required.
 - 3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls, as required.
 - 4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies, as required.
- C. The drawings provided are diagrammatic in nature and all dimensions shall be field-verified by the Contractor prior to installation. Coordination drawings shall be submitted by the Contractor for review prior to installation. Coordination drawings to indicate acceptable clearance around new piping/valves/etc. from all other new & existing service piping and equipment. Valve operator access shall also be coordinated per the requirements of this specification.
- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
 - 1. Test procedures used.

2. Test results that comply with requirements.
 3. Failed test results and corrective action taken to achieve requirements.
- F. Maintenance Data: For steam traps, vacuum breakers, and meters to include in maintenance manuals specified in Division 01.

1.4 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- B. ASME Compliance: ASME Compliance: Comply with ASME B31.1, "Power Piping," and ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.

1.5 COORDINATION

- A. Coordinate layout and installation of new piping and hangers with other construction, including light fixtures, hydronic piping, fire-suppression-system components, partition assemblies, flash tanks, condensate pumps, existing equipment and existing steel supports being reused.
- B. Coordinate pipe fitting pressure classes with products specified in related Sections.
- C. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.
- B. Piping System Classification:
1. Piping systems designed for steam pressure 15 psig and below are low-pressure steam systems. Piping systems designed for steam pressures above 15 psig up to and including 150 psig are high-pressure steam.
- C. Piping Materials:
1. Sizes as scheduled and shown on the Drawings are nominal pipe sizes unless otherwise indicated.
 2. All pipe and fittings shall be manufactured by a domestic company.

3. All brass and bronze piping components shall have no more than 15 percent zinc content.

D. Threaded Fittings:

1. All threaded fittings shall be USA factory made wrought carbon or alloy steel threaded fittings conforming to ASTM A234 or malleable iron threaded fittings conforming to ASME/ANSI B16.3.
2. Manufacturers: Grinnell, Tube Turn, Weld Bend Hackney, Taylor Forge, Ladish Company.
3. Each fitting shall be stamped as specified by ANSI B16.3.

E. Welded Fittings:

1. All weld fittings shall be USA factory made wrought carbon steel, butt welded fittings conforming to ASTM A234 or ASME B16.9.
2. Manufacturers: Grinnell, Tube Turn, Weld Burn Hackney, Taylor Forge, Ladish Company or approved equal.
3. Each fitting shall be stamped as specified by ANSI B31.9.

F. Flanges:

1. All 150 lb. and 300 lb. ANSI flanges shall be weld neck and shall be domestically manufactured, forged carbon steel, conforming to ANSI B16.5 and ASTM A1-191 Grade I or II or A-105 as made by Tube Turn, Hackney, Ladish Company or approved equal. Slip on flanges shall not be used. Complete test reports may be required for any fitting selected at random.
2. Flanges shall have the manufacturer's trademark permanently identified in accordance with MSS SP-25.
3. Bolts used shall be carbon steel bolts with semi-finished hexagon nuts of American Standard Heavy dimensions. All-thread rods are not an acceptable substitute for flange bolts. Bolts shall have a tensile strength of 60,000 psi and an elastic limit of 30,000 psi.
4. All flanges shall have gaskets. Place gasket between flanges of flanged joints. Gaskets shall fit within the bolt circle on raised face flanges and shall be full face on flat face flanges.

G. Gaskets:

1. Gaskets shall be placed between the flanges of all flange joints. Such gaskets shall be ring form gaskets fitting within the bolt circle of their respective flanges.
2. All gaskets used on steam system shall be Flexitallic Style CG, API 601 spiral wound 304 SS with Grafoil fill as manufactured by Garlock or approved equal, regardless of pipe size and pressure.

3. The inside diameter of such gaskets shall conform to the nominal pipe size and the outside diameter shall be such that the gasket extends outward to the studs or bolts employed in the flanged joint.

2.2 PIPE

A. High Pressure Steam, Boiler Feedwater, Blowdown (IBD & CBD), and Condensate Piping:

1. Pipe 2 inches and smaller: Carbon steel, Schedule 80, ASTM A53, Grade B, seamless, or ASTM A106, Grade B.
 - a. Fittings: Forged steel, ASTM A105, socket weld, Class 3000.
 - b. Joints: Socket weld.
 - c. Unions: Forged steel, ASTM A105, socket weld, Class 3000, stainless steel seats.
 - d. Gaskets: Flexitallic Style CG, API 601 spiral wound 304SS with Grafoil Fill or approved equal.
2. Pipe 2-1/2 inches and larger: Carbon steel, ASTM A53, Grade B, seamless; standard weight for steam, feedwater & blowdown, and ERW schedule 80 for condensate.
 - a. Fittings: Carbon steel, ASTM A234 WPB, butt weld fittings, standard weight for steam, Schedule 80 for condensate.
 - b. Joints: Butt weld.
 - c. Flanges: Class 150, ANSI forged carbon steel, ASTM A181 Class 70, weld neck raised face.
 - d. Gaskets: Flexitallic Style CG, API 601 spiral wound 304SS with Grafoil Fill or approved equal.

B. Low Pressure Natural Gas and Scanner Air Piping:

1. Pipe 2 inches and smaller: Schedule 80, carbon steel, ASTM A53, Grade B seamless, or ASTM A106, Grade B.
 - a. Fittings: Forged steel, ASTM A105, socket weld, Class 3000.
 - b. Joints: Socket weld.
 - c. Gaskets: Flexitallic Style CG, API 601 spiral wound 304SS with Grafoil Fill or approved equal.
2. Pipe 2-1/2 inches and larger: Standard weight, carbon steel, ASTM A53, Grade B seamless, or ASTM A106, Grade B.
 - a. Fittings: Carbon steel, ASTM A234 WPB, butt weld fittings, standard weight.
 - b. Joints: Butt weld.

- c. Flanges: Class 150, ANSI forged carbon steel, ASTM A181 Class 70, weld neck raised face.
- d. Gaskets: Flexitallic Style CG, API 601 spiral wound 304SS with Grafoil Fill or approved equal.

C. Equipment Drain Piping:

- 1. All factory fabricated or field erected steam equipment or apparatus that require drains shall be connected with adequately sloped drain line routed to a floor drain.
- 2. All drain piping shall be one-inch minimum diameter or larger as indicated on the Drawings or required by equipment. Such piping shall be standard weight galvanized steel pipe with galvanized malleable iron screw tees at each change in direction; or Type K, hard drawn copper tubing with threaded joints and fittings.
- 3. Install screw plug in unused openings for access to rod and clean.

2.3 VALVES

A. General:

- 1. All valves used in steam systems (low and high pressure) shall be Class 150 SWP. Class 300 valves shall be constructed of all ASTM B-61 composition. All gate, globe and angle valves shall be union bonnet design. Metal used in the stems of all bronze gate, globe and angle valves shall conform to ASTM B371 Alloy 694, ASTM B99 Alloy 651 or other corrosion resistant equivalents. Written approval by the Owner must be secured for the use of alternative materials.
- 2. Manufacturers: NIBCO, Crane, Velan, Williams and Vogt or approved equal.
- 3. All ductile Iron body valves shall have pressure containing parts constructed of ASTM A-395. Ductile iron stem material shall meet ASTM 371 Alloy 876 silicon bronze or its equivalent. Gates and globes shall be bolted bonnet with OS&Y (outside screw and yoke) and rising stem design.
- 4. All cast steel body valves shall have the pressure containing parts constructed of ASTM designation A-216-GR-WCB carbon steel. Gate and globe valves shall be bolted bonnet outside and screw and yoke design with pressure-temperature rating conforming to ANSI B16-34-1977. Stems shall meet ASTM designation A-182-F6 chromium stainless steel. Wedge (gate valves) may be solid or flexible type and shall meet ASTM A-182-F6 chromium stainless steel on valves from 2 inch to 6 inch. Sizes 8 inch and larger may be A-216-WCB with forged rings or overlay equal to 182-F6. Seat ring shall be hard faced carbon steel or 13 percent chromium A-182-F6 stainless. Handwheels shall be A47 Grade 35018 malleable iron or Ductile Iron ASTM A536.
- 5. All forged steel body valves shall have the pressure containing parts constructed of ASTM 105, Grade 2 forged carbon steel. Seat and wedges shall meet ASTM A-182-F6 chromium stainless steel. Seat rings shall be hard faced. Valves shall conform to ANSI B16-34 pressure-temperature rating.

6. All gate valves, globe valves, angle valves and shutoff valves of every character shall have malleable iron hand wheels, except iron body valves 2-1/2 inches and larger which may have either malleable iron or ASTM A-126 Class B, gray iron hand wheels.
7. Packing for all valves shall be free of asbestos fibers and selected for the pressure-temperature service of the valve. It is incumbent upon the manufacturer to select the best quality, standard packing for the intended valve service.
8. Valves 6 inches and larger located with stem in horizontal position shall be drilled and tapped in accordance with MSS-SP-45 to accommodate a drain valve and equalizing bypass valve assembly.
9. Valve Operator: Provide valve chain operator type on all shutoff valves shown on the Drawings that are 7'-6" above finished floor and higher. Chain operator shall be chain wheel of cast iron or malleable iron and designed to provide positive grip on wheel. Provide chain guide to prevent chain from slipping or jumping on wheel. Employ rust-proof chain complete with closing link of sufficient length to operate at 6'-6" above floor level.

B. Gate Valves:

1. High Pressure Steam, Boiler Feedwater, Blowdown (IBD & CBD), and Condensate Piping:
 - a. Socket Welded Pipe: Class 800, carbon steel, ASTM A105, welded bonnet, bolted gland, outside screw and yoke. Thread ends Vogt Ser. 2801 or socket weld Vogt 2801 SW.
 - b. Welded Pipe: Class 300 OS&Y, bolted flexible wedge disc. Crane Fig. No. 33 welded and flanged.
2. Low Pressure Natural Gas and Scanner Air Piping:
 - a. Socket Welded Pipe: Class 800, carbon steel, ASTM A105, welded bonnet, bolted gland, outside screw and yoke. Thread ends Vogt Ser. 2801 or socket weld Vogt 2801 SW.
 - b. Welded Pipe: Class 300 OS&Y, bolted flexible wedge disc. Crane Fig. No. 33 welded and flanged.

C. Globe Valves:

1. High Pressure Steam, Boiler Feedwater, Blowdown (IBD & CBD), and Condensate Piping:
 - a. Manufacturers: NIBCO, Crane, Williams, Vogt, Velan. or approved equal.
 - b. Socket Welded Pipe: Class 800, carbon steel, welded bonnet, bolted gland, outside screw and yoke. Thread ends Vogt Ser. 2821 or socket weld Vogt 2821 SW.

D. Ball Valves:

1. Two-piece bronze body rated at 150 psi steam, TFE seats, stainless steel ball and stem. NIBCO T-585-70-66.

2. The following manufacturers are acceptable if they comply with the specification: NIBCO, Apollo, or Watts or approved equal.

PART 3 - EXECUTION

3.1 ERECTION OF PIPING SYSTEMS

A. General

1. Although all systems may not be fully described as to every piece of pipe and associated component, the Contractor shall be responsible to completely install the necessary piping to provide a fully operationsystem.
2. All piping systems and components shall exceed the design pressure and temperature stress allowances outlined in their appropriate ANSIspecification.
3. Unless otherwise specified, fabrication, assembly, threading, welding, soldering, and brazing shall conform to NFPA Z223.1, ANSI B31.9 and the applicable codes and ordinances local to the place of installation, and in accordance with the specifications and standards referred herein for all pipingsystems.
4. The work under this Section shall include obtaining all information and measurements which are required to make the work fit properly and to avoid interference with the work of other trades.

B. Piping Installation

1. All piping shall be run perpendicular and/or parallel to floors, walls, etc, unless otherwise indicated on drawings. Piping and valves shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance.
2. Piping shall in no way obstruct doorways, passageways, or operating aisles, or interfere with access to equipment. Sufficient clearance shall be allowed for equipment repairs, servicing, removal and replacement of parts, headroom and walkways.
3. Minimum overhead clearances, unless otherwise specified to underside of flanges, insulation, or bottom of structural supports required over roads, platforms, and other items shall be as follows:

Above Floor within a Building:	7'-0"
Above Elevated Platforms:	7'-0"
4. Offsets shall be made in piping where required to avoid interferences with other work, to increase head room beneath, from expansion loops, or changes in direction as may be indicated on the Contract Drawings, or as required to permit freedom of movement during expansion or contraction without causing undue stresses to the pipe or equipment. Offsets shall be installed so as not to interfere with drainage or cause the formation of air pockets.
5. All field run piping shall be accurately cut to measurements established at the construction site. All overhead piping shall be run as high as possible under structural members or as located on the drawings.

6. Provide minimum side clearance of two inches unless otherwise specified, between parallel lines, outside of insulation or between flange and pipe insulation, to permit ready access for removal or maintenance of pipeline. Take into consideration thermal movements in determining side clearances. Minimum unobstructed walkway clearance shall be 3'-0" unless otherwise specified.
 7. Piping shall be installed without springing or forcing, to properly clear all openings and equipment. Cutting or other weakening of structural members to facilitate pipe installation shall be prohibited.
 8. Piping subject to expansion shall be installed to permit free expansion and contractions without damage to joints or supports and without interference from other pipes, equipment, and/or structures.
 9. Mitering of pipe or use of field-fabricated welding fittings is prohibited.
 10. All piping shall be installed in a manner that permits draining of all water and venting of all vapors as necessary i.e. high point vents and low point drains.
 11. Reducing fittings shall be used for changes in pipe size; the use of bushings will not be permitted. In horizontal lines, reducing fittings shall be of the eccentric type to maintain the bottom of the lines in the same place for steam lines and to maintain the top of the lines in the same place for water lines.
 12. Unless otherwise indicated on the Contract Drawings, water piping shall be sloped up in the direction of flow. No slope shall be less than 1/4 inch in 20 feet.
 13. The Contractor shall supply and install all required instrument, sampling and control piping, tubing, valves, tops, etc. as required by the Contract Documents.
 14. Fabricated piping shall be correctly positioned relative to connection points before welding.
 15. Erection of all equipment piping not furnished as an assembled equipment package, shall be installed in the field in accordance with Contract Documents.
 16. Support piping independently at all equipment so that equipment is not stressed by piping weight or expansion.
- C. Branch Connections
1. No nozzles or branch connections shall be fabricated in the shop or field by attaching directly to the run pipe by welding if the branch is of the same NPS or greater than the run piping.
 2. Full size branch connections shall be made with ANSI standard fittings as specified in the applicable parts of this Section.
 3. Reduced size branch connections shall be made with fittings specifically designed for such purposes.
 4. Unless noted otherwise, "O-let" style of connections may be used only when branch connection is less than half the nominal pipe size of the run piping. Direct connection of branch to a main run shall not be permitted.

5. Branch reinforcement is not necessary when the wall thickness of the main run and branch are sufficiently in excess of that required to sustain the design pressure.

D. Flanged Joints

1. Where flanges and flanged fittings of the 300 lb. series are to be bolted to an adjacent mating cast iron flange of a valve, fitting, or equipment, the steel raised faced shall be machined off flush for full face gaskets. In this event, the resulting minimum thickness of flange as specified in ANSI B 16.5 is reduced by 1/16" caused by the removal of the raised face.
2. Flange bolt holes shall straddle pipe centerlines.
3. Clearances between flange faces shall allow for the joints to be gasketed and bolted tight without imposing undue strain on the piping system.
4. Bolts shall be tightened to a uniform pressure on the gasket in order to assure leak free joints.

3.2 INSTRUMENT, CONTROLS AND SAMPLING PIPING SYSTEMS

A. General

1. The materials utilized for valves, fittings, tubing, and piping shall meet the particular conditions of the main piping run.
2. Takeoff connections at the source, together with attachment bosses, nozzles, and adapters, shall be made of material at least equivalent to that of the pipe or vessel to which they are attached. The connections shall be designed to withstand the source design pressure and temperature and be capable of withstanding loading induced by relative displacement and vibration.
3. The nominal size of the takeoff connections shall not be less than NPS 1/2" for service conditions less than 900 psig or 800 F. Where the size of the main is smaller than the limits given above, the takeoff connection shall not be less than the size of the main line.
4. Shutoff valves shall be provided at takeoff connections. They shall be capable of withstanding the main line design pressure and temperature, including any adapters or nipples.
5. Contractor shall be responsible for all connections between main piping runs and the applicable instrumentation devices as outlined in the Contract Documents.
6. Instruments, valve assemblies and pipe mounted items that must be observed, adjusted or regularly serviced shall be located where accessible from an operating platform or grade.
7. Instrument, control and sampling piping shall be subject to the hydrostatic pressure test of the main system. Individual devices need not be subjected to the test and shall be outfitted with an isolation valve.
8. The piping and/or tubing systems required for the proper and complete installation of any instrument, including all fittings and valves, shall be designed to the same piping

code class as the process system into which the instrument is tapped. The instrument piping and/or tubing system is defined, for purposes of uniform coding, to extend from the discharge port of the last process system root valve to, and including instrument connection.

9. The inside of all piping, tubing, valves and fittings shall be smooth, clean and free of blisters, loose mill scale, sand, kinks and dirt when erected.

3.3 WELDING

B. General

1. All welding of pipe joints and procedures shall be in accordance with the following:
 - a. Section IX - Welding and brazing qualifications of the ASME Boiler and Pressure Vessel Code.
 - b. American Welding Society B2.1 – Specification for Welding Procedure and Performance Qualifications.
 - c. ASME B31.1 Power Piping and B31.9 Building Services Piping.
2. The Contractor shall prepare Certification of Welder Performance Qualification Test containing the information detailed in form QW-484 and QB-484, of ASME Section IX for all welders to be employed for fabrication. These documents shall be provided to the Engineer for approval of each welder, and shall be kept on file by the Contractor. Only Engineer approved welders may weld any pipe on the project.
3. Parts that are to be joined by welding may be held in alignment during the welding process by using bars, jacks and clamps.
4. Socket weld couplings shall be used for welded line joints, where specified, in nominal pipe sizes 1-1/2 inches and smaller.

C. Piping

1. Weld end preparations for field joints and for joining to Contractor supplied items shall be in accordance with Chapter V of ASME B31.1. All weld ends preparation dimensions shall be in accordance with ASME B16.25.
2. Base pipe material shall be prepared in accordance with the following:
 - a. The edges or surfaces of the parts to be joined by welding shall be machined and cleaned of all oil, grease, scale, rust, or other deleterious materials.
 - b. Maximum joint gap distance shall be 3/16" for 2 1/2 NPS pipe and larger and 1/8" for 2" NPS and smaller.

D. Welding Processes

1. Welding shall be performed by one or more of the following processes. Other processes may be permitted when the technical adequacy has been demonstrated to the satisfaction of the Owner and Engineer.
Shielded Metal Arc (SMAW) - Only low hydrogen electrodes shall be permitted.

- a. Gas-Tungsten Arc (GTAW) – Non-consumable tungsten electrodes shall be AWS A5.12 Class EWTh-2. Filler metal addition shall be used with the gas tungsten arc process.
 - b. Gas Metal-Arc (GMAW) - The short circuiting arc deposition transfer mode shall not be used to join materials greater than 1/4" thickness. This practice may be used to deposit the root pass and additional weld passes in the root region of butt joints up to a deposited weld metal thickness of 1/4".
 - c. Flux Cored Arc (FCAW) - Cored wire designed for operation without the use of externally supplied shielding gas (i.e., self-shielded typed) is not allowed. Such wire shall not be considered acceptable if used with shielding gas.
2. The following shall establish, at a minimum the quality controls that shall be incorporated with any of the above mentioned welding processes:
 - a. Initiation points of all weld passes and weld layers shall be staggered.
 - b. When using the shielded metal arc process, the depth of weld metal deposited in each layer shall not exceed 3/16 inch.
 - c. Vertical position welding shall proceed uphill.
 - d. Complete penetration and fusion shall be achieved in all regions of the weld zone.
 - e. All slag, flux or foreign materials remaining on any bead of welding shall be removed by grinding, chipping or wire brushing before depositing the next or successive bead.
 - f. Any cracks, slag incursions, incomplete fusion or blow holes that appear on the surface of any bead of welding shall be removed by chipping or grinding before depositing the next successive bead of welding.
 - g. Refer to Section 23 02 00 Basic Mechanical Materials and Methods, Paragraph 1.6 for Quality Assurance with welding procedures.

E. Filler Materials

1. All welding filler materials, including any consumable inserts, shall comply with the requirements of ASME or AWS filler material specifications.
2. All welding filler materials shall be stored in a clean, dry location protected from contamination.
3. After opening of new sealed electrode containers or removal of electrodes from drying ovens, all electrodes, which are not immediately issued for use, shall be stored in holding ovens at a minimum temperature of 200°F.

3.4 VISUAL INSPECTION OF WELDS

- A. Visual examinations shall be performed by the Contractor's qualified inspection and testing agency on 100% of all field welds to detect surface discontinuities in completed welds. Visual examination shall be performed on the final pass only. The Contractor shall retain the ser-

vices of a qualified commercial inspection or testing laboratory to examine the welds. All welds, including all off-site welds, shall be visually inspected. All welds shall be visually inspected for cracks, contour and finish, bead reinforcement, undercutting, overlap, and size of fillet welds.

- B. The visual inspection shall examine each weld for any defects. The visual inspection shall be performed in accordance with ASME B31.1, section 136.4.1. to 136.4.2. The Contractor shall immediately repair any defects noted in the visual inspection, including but not limited to the following:
1. Cracks – external surface.
 2. Undercut on surface, which is greater than 1/32 inch deep.
 3. Weld reinforcement greater than 5/32 inch.
 4. Lack of fusion of surface.
 5. Incomplete penetration.
 6. Convexity of fillet weld surface greater than 10 percent of longest leg plus 0.03 inch.
 7. Concavity in groove welds.
 8. Concavity in fillet welds greater than 1-1/4 times the minimum specified fillet leg length.

The following additional visual quality examinations shall be performed:

1. Arc strikes shall be removed by grinding and the area examined for freedom from defects by liquid penetrate. Any crack or linear indications are unacceptable.
 2. Grinding shall not result in a reduction in wall thickness below the minimum required by the applicable code, material specification, or design calculation.
 3. Each weld shall be uniform in width and size throughout its full length.
 4. Wash pass welding (re-melting cover pass to smooth weld contour) is prohibited.
 5. Butt welds shall be full penetration.
 6. Socket welds, depth of insertion of pipe or tube within the socket or sleeve shall be 3/8 inch minimum.
 7. Attachment Welds: All temporary welded attachments used for erection purposes shall be removed by mechanical cutting or air-arc cutting the attachment a distance from the supporting metal surface sufficient to preclude damage, but in no case less than 1/8 inch. The remainder of the attachment shall be ground flush with the base metal surface. The ground area shall then be examined visually to ensure freedom from defects. Under no conditions are temporary attachments to be removed by hammer blows.
- C. The Contractor's qualified testing agency shall furnish written reports for each visual inspection performed by the qualified commercial inspection or testing laboratory prior to installing any insulation on the carrier pipe.

3.5 RADIOGRAPHIC EXAMINATION OF WELDS

- A. The Contractor shall engage a qualified Independent Testing Agency to provide radiographic examination of the welds. The owner will require 100% radiographic examination of the natural gas pipe welds and 10% radiographic examination of the pipe welds for all other systems in the power plant. The Contractor shall provide access to all welds selected by the owner for testing, and shall provide full cooperation with the testing agency.
- B. All radiographic examinations shall be performed in accordance with ASME B31.1, section 136.4.5. Welds that are shown by radiography to have any of the following types of discontinuities are unacceptable:
1. Any type of crack or zone of incomplete fusion or penetration. Any other elongated indication which has a length greater than:
 $\frac{1}{4}$ inch for t up to $\frac{3}{4}$ inch inclusive.

 $\frac{1}{3} t$ for t from $\frac{3}{4}$ inch to $2\frac{1}{4}$ inch inclusive

 $\frac{3}{4}$ inch for t over $2\frac{1}{4}$ inch
 2. Any group of indications in line that have an aggregate length greater than t in a length of $12t$, except where the distance between the successive indications exceeds $6L$ where L is the longest indication in the group.
 3. Porosity in excess of that shown as acceptable in Appendix A-250 of Section I of the ASME Boiler and Pressure Vessel Code.
 4. Root concavity when there is an abrupt change in density, as indicated on the radiograph.
- C. Any unacceptable defects encountered during the radiographic examination shall be repaired by the Contractor at no additional cost to the owner. All repairs will be re-inspected. The additional examination shall continue until the selected weld joints are found acceptable at the first testing of the joint. All costs associated with the additional radiographic examination shall be paid by the Contractor using the Contractor's qualified testing agency.

3.6 PIPING INSTALLATIONS

- A. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- B. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- C. Install steam supply piping at a uniform grade of 0.2 percent downward in direction of steam flow.
- D. Install condensate return piping at a uniform grade of 0.4 percent downward in direction of condensate flow.

- E. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- F. Unless otherwise indicated, install branch connections to steam mains using 45-degree fittings in main pipe, with the takeoff coming out the top of the main pipe. Use of 90-degree tee fittings is permissible if 45-degree fittings are impractical. If length of branch takeoff is less than 10 feet, pitch branch line down toward mains at a 0.4 percent grade.
- G. Install unions in piping NPS 2 and smaller adjacent to each valve, at final connections of each piece of equipment, and elsewhere as indicated.
- H. Install flanges in piping NPS 2-1/2 and larger at final connections of each piece of equipment and elsewhere as indicated.
- I. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, traps, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.
- J. Anchor piping for proper direction of expansion and contraction.
- K. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.
 - 1. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet where pipe is pitched down in direction of steam flow and a maximum of 150 feet where pipe is pitched up in direction of steam flow.
 - 2. Size drip legs at vertical risers same size as pipe and extend beyond rise. Size drip legs at other locations same diameter as main. In steam mains NPS 6 and larger, dirt leg size can be reduced, but to no less than NPS 4.
 - 3. Install gate valve at drip legs, dirt pockets, and strainer blowdowns to allow removal of dirt and scale.
 - 4. Install steam traps close to drip legs.
- L. Pitch condensate piping down toward flash tank. If more than one condensate pipe discharges into flash tank, install a swing check valve in each line. Install thermostatic air vent at top of tank. Install inverted bucket or float and thermostatic trap at low-pressure condensate outlet, sized for three times the condensate load. Install safety valve at tank top. Install pressure gage, gate valve, and swing check valve on low-pressure (flash) steam outlet.
- M. Blowdown piping header located at the inlet to the existing intermittent blowdown tank (approx. 4'-0" in length) shall be provided as minimum SCH 80 piping to prevent corrosion concerns where multiple services join the header piping. These connections shall also be angled 45 degrees, in the direction of flow, to further reduce impact of corrosion.

3.7 HANGERS AND SUPPORTS

- A. Piping support must account for expansion and contraction, vibration, dead load of piping and its contents, and seismic bracing requirements.
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.

3.8 PIPE JOINT CONSTRUCTION

- A. Refer to Division 23 Section "Basic Mechanical Materials and Methods" for joint construction requirements for threaded, welded, and flanged joints.

3.9 FIELD QUALITY CONTROL

- A. Prepare steam and condensate piping according to ASME B31.9 and as follows:
 - 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Flush system with clean water. Clean strainers.
 - 3. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 - 4. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on steam and condensate piping:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. While filling system, use vents installed at high points of system to release trapped air. Use drip legs installed at low points for complete draining of liquid.
 - 3. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
 - 4. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening,

repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

5. Prepare written report of testing.

3.10 ADJUSTING

- A. Mark calibrated nameplates of pump discharge valves after steam and condensate system balancing has been completed, to permanently indicate final balanced position.
- B. Perform these adjustments before operating the system:
 1. Open valves to fully open position. Close coil bypass valves.
 2. Set temperature controls so equipment is calling for full flow.

3.11 CLEANING

- A. Flush steam and condensate piping with clean water. Remove and clean or replace strainer screens.

END OF SECTION 232213

SECTION 235316 - DEAERATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes packaged, factory-assembled deaerator.

1.3 DEFINITIONS

- A. DDC: Direct digital control.
- B. Feedwater Pump: Pump that moves feedwater from the deaerator to the boiler.
- C. NPSHR: Net-positive suction head required.
- D. Transfer Pump: Pump that moves feedwater from the surge tank to the deaerator.

1.4 ACTION SUBMITTALS

- A. Product Data: For each unit to include the following:
 - 1. Equipment performance and operating characteristics, such as rated makeup water, feedwater, steam condensate and steam flow rates; oxygen content rating; maximum turndown; working pressure; tank capacities, storage capacity in minutes; temperature and NPSHR; and pump performance curves with selection points clearly indicated.
 - 2. Furnished specialties and accessories.
 - 3. Construction details, material descriptions, dimensions and weight of individual components, and profiles and finishes.
 - 4. Force and moment capacity of each field piping connection.
 - 5. Dimensioned location of low, high, and normal water level showing operating set point and each alarm set point.
 - 6. Temperature and pressure rating, size, and materials of construction for trim components including, piping, fittings, flanges, unions, and valves. Provide valve manufacturer Product Data for each valve furnished. For safety valves, include trip and reset settings and flow capacity.
 - 7. Manufacturer Product Data showing size, scale range, and accuracy of thermometers and pressure gages.
 - 8. Detailed information of controls including Product Data with technical performance, hardware & software manufacturers, operating characteristics, and sequence of operation.

9. Product Data for each motor, including performance, operating characteristics, and materials of construction.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, access platforms with railings & ladders, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring. Differentiate between factory and field installation. Individually label all instrument tags.
4. Include piping diagrams of factory-furnished piping that indicate size and each piping component.

C. Delegated-Design Submittal: For deaerators, signed and sealed by a qualified professional engineer.

1. Include signed and sealed seismic design calculations for structural steel framing, access platforms and base.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plan and elevation views, drawn to a minimum $\frac{1}{4}'' = 1'-0''$ scale, indicating equipment manufacturer's service clearances, access platforms coordinated for valve operation and gauge reading, structure and base attachment, piping, power, and controls. Each view to show screened background with the following:

1. Column grids, beams, columns, and concrete equipment bases.
2. Room layout with walls, floors, floor drains, and roofs, including each room name and number.
3. Equipment and products located in vicinity of deaerators and part of final installation including products of other trades, such as lighting, fire suppression systems, continuous blowdown tank, existing service piping and plumbing systems.

B. Seismic Qualification Certificates: For deaerators, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Source quality-control reports.

D. Startup service reports.

- E. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to deaerator.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For deaerators, components, and accessories to include in emergency, operation, and maintenance manuals. Provide (2) hardcopies and (1) electronic copy.
- B. Spare Parts List: Recommended spare parts list with quantity for each.
- C. Touchup Paint Description: Detailed description of paint used in application of finish coat to allow for procurement of a matching paint including color and type.
- D. Instructional Videos: Including those that are prerecorded and those that are recorded during training.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Gaskets: Furnish one replacement gasket for each gasketed opening.
 - 2. Gage Glass: Furnish one replacement glass for each gage glass.
 - 3. Pump Mechanical Seal Set: Furnish one replacement mechanical seal set for each unique pump mechanical seal.
- B. Tool Kit:
 - 1. A tool kit specially designed by deaerator manufacturer for use in servicing deaerator furnished.
 - 2. Special tools required to service deaerator components not readily available to Owner service personnel in performing routine maintenance.
 - 3. Lockable case with hinged cover, marked with large and permanent text to indicate the special purpose of tool kit, such as "Deaerator Tool Kit." Text size shall be at least 1 inch high.
 - 4. A list of each tool furnished. Permanently attach the list to underside of case cover. Text size shall be at least 0.5 inch high.
- C. Touchup Paint: 32 oz. container of paint used for finish coat. Label outside of container with detailed description of paint to allow for procurement of a matching paint in the future.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Ship deaerator from the factory free of water. Drain water and blow deaerator dry with compressed air if required to remove all water before shipping.

- B. Cover and protect flanges, pipe openings, nozzles, bearings, and couplings from damage during shipping, storage, and handling.
- C. Cover and protect electrical and control devices and open connections.
- D. Comply with manufacturer's written rigging instructions.
- E. Deliver deaerator as factory-assembled unit with protective crating and covering.
- F. Protect deaerator components with removable temporary enclosures to prevent damage during shipping, storage, and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cleaver-Brooks.
 - 2. Cochrane (Newterra).
 - 3. Shipco Pumps.
 - 4. or, Approved Equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Deaerator shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the deaerator will remain in place without separation of any parts when subjected to the seismic forces specified and the deaerator will be fully operational after the seismic event."
 - 2. Component Importance Factor: Refer to Structural Drawing S-001.
 - 3. Spectral Response Acceleration:
 - S_s Refer to Structural Drawing S-001.
 - S₁ Refer to Structural Drawing S-001.
- B. Operation Following Loss of Normal Power:
 - 1. Equipment, associated factory- and field-installed controls, and associated electrical equipment and power supply connected to backup power system shall automatically return equipment and associated controls to the operating state. This shall occur immediately following loss of normal power without need for manual intervention by an operator when power is restored either through a backup power source or through normal power if restored before backup power is brought on-line.
 - 2. Provide means and methods required to satisfy requirement even if not explicitly indicated.
- C. 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.

- D. ASME Compliance: Fabricate and label deaerator and components to comply with ASME Boiler and Pressure Vessel Code Section VIII Division 1 per State of New Jersey.

2.3 MANUFACTURED UNITS

- A. Atomizing, spray type deaerator with integral horizontal storage vessel.
- B. Material for Wetted Components: Components in contact with water that has not been deaerated shall be made of Type 304 stainless steel.
- C. Adjustable Spray Nozzles: Type 316 stainless steel.
- D. Atomizing valve shall be of the variable orifice, self-regulating type to assure guaranteed performance between 5% and 100% of total capacity.
- E. Integral Horizontal Storage Tank: Welded carbon steel, with automatic and manual vent valves.
 - 1. Additional Corrosion Protection:
 - a. 0.125-inch thickness allowance or epoxy lining. Epoxy liner shall be Carboline Plasite 7159, or approved equal.
 - b. Electrolytic corrosion-inhibitor anode.
 - 2. Access: Manhole in integral horizontal storage tank for access to internal components for inspection and service.
 - 3. Factory-Installed Pipe, NPS 2 and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106/A 106M, Type S, Grade B, Schedule 80; with forged carbon steel socket weld fittings.
 - a. Forged-Steel Fittings: ASME B16.11, Class 3000.
 - b. Forged-Steel Unions: MSS SP-83, Class 3000.
 - 4. Factory-Installed Pipe, NPS 2-1/2 and Larger: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106/A 106M, Type S, Grade B, Schedule 40; with welded joints and carbon-steel fittings and flanges.
 - a. Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - b. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150, including bolts, nuts, and gaskets.
- F. Accessories:
 - 1. Lifting eyes.
 - 2. Companion flanges.
 - 3. Pump suction piping with anti-vortex plate, isolation valve, strainer, liquid-filled pressure gage graduated in pounds force per square inch, and flexible connector.
 - 4. Pump discharge piping with check valve, isolation valve(s), liquid-filled pressure gage graduated in pounds force per square inch, and Automatic Recirculation Control (ARC) valve sized to provide continuous pump operation with boiler feedwater valve closed.
 - 5. Condensate Inlet Assembly:

- a. Factory-mounted, electric, modulating valve with factory-mounted, water-level controller. Water level controller to include level transmitter, (3) level switches (High, Low, and Low-Low), alarms, etc.
 - b. Factory-mounted, three-valve bypass and inlet strainer.
6. Steam Pressure-Reducing Valve(s): Field-mounted, pneumatically operated, and sized to reduce boiler outlet pressure to the deaerator design pressure.
 - a. (2) Steam Pressure-Reducing Valves shall be provided in a 1/3 & 2/3 operating scheme to improve turndown control and increase redundancy.
 7. Tank Overflow Control Valve with fail-open actuator and solenoid valve.
 8. Safety Valve(s): Factory-mounted, ASME labeled and sized to relieve full capacity of pressure-reducing valve(s) in addition to 10,000 lb/hr of high pressure return. Provide each safety valve with a drip-pan elbow.
 9. Vents: Factory-mounted, manual and automatic vent valves.
 - a. Automatic air vents shall be thermostatically controlled to provide a fast means of venting when a sudden buildup of gas occurs.
 - b. Manual air vents shall have an orifice to provide continuous venting at a rate of up to 0.1 percent of rated deaerator capacity at operating pressure indicated.
 10. High-temperature condensate diffuser tube.
 11. Vacuum breaker.
 12. Meters and Gages:
 - a. Full-height, water-level gage glass, reflex flat type, with casing to protect glass and stop valve set, ball check and shutoff cocks, water-column blowdown valves, and vacuum breaker.
 - b. Thermometer:
 - 1) Liquid-filled industrial thermometer graduated in Fahrenheit mounted to measure temperature in storage section of tank.
 - 2) Graduated scale with a range of approximately 1.5 times the normal operating temperature.
 - 3) Any angle position adjustment.
 - 4) Mount thermometer in a Type 316 stainless-steel thermowell.
 - c. Pressure Gage:
 - 1) Pressure gage graduated in pounds force per square inch mounted to measure pressure in steam section of tank, pressure at feedwater pump suction and pressure at feedwater discharge manifold pipe.
 - 2) Nominal 4-inch- diameter face with graduated scale and siphon with isolation valve. Gage shall have normal operating pressure about 50 percent of full range and an accuracy of 0.5 percent.
 - d. Meters and gages shall be easily readable by operator standing at grade adjacent to unit. Provide remote reading gages if required to comply with requirement.
 13. Two (2), stainless steel, chemical injection quills with isolation and check valves and ½” FNPT coupling.
 14. Tank drain connection with valve.

- G. Support Frame: Structural-steel frame for supporting tank, pumps and access platform(s). Weld or bolt to tank.
1. Fabricate support frame with bracing adequate for seismic forces according to authorities having jurisdiction and to allow installation by anchoring deaerators to floor only.
 2. Minimum height of frame shall be as required by application, but not less than 12'-0".
 3. Support frame shall be adequately sized to support additional loads associated with access platforms, railings, ladders, etc. for use by Operations Personnel and for maintenance procedures.
- H. Access Platforms: Structural-steel framing with galvanized steel grating, kick plates, railings, access ladders, etc. designed and installed per OSHA and coordinated to maintain safe access to all factory- and field-installed valves, gauges, etc. for operation and maintenance.
1. Minimum of one level of access platforms shall be required for access to the deaerator accessories. Additional platform levels shall be provided, as necessary, to provide access to any/all deaerator valves, gauges, etc. located out of reach/sight to allow for safe operation and servicing.
 2. All access ladders shall be of the caged type, as required per OSHA, and shall be provided with self-closing gates.
 3. Platform railings and kick plates shall be constructed of welded/bolted steel and shall be sufficiently high to meet the requirements of OSHA.
 4. All steel platform framing, railing, kick plates, etc. shall be painted to match deaerator. Galvanized steel platform grating shall not require painting.
- I. Feedwater Pump: Vertical, cast-iron, base-mounted volute; with stainless-steel, multistage centrifugal impellers, and stainless-steel shaft.
1. Seals: Mechanical, suitable for 250 deg F.
 2. Pump Motor: Vertical, close coupled to pump.
 - a. Efficiency: Premium efficient.
 - b. Enclosure: Totally Enclosed Fan Cooled.
 - c. Insulation Class: F.
 - d. Service Factor: 1.15.
 - e. Motors operated through variable-frequency controllers shall be inverter duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
 3. Motor Sizes: Minimum size as indicated and large enough so driven load does not require motor to operate in service factor.

2.4 CONTROLS

- A. Factory-installed and -wired controllers, meters, sensors, switches, transformers, transmitters, valves, and other control devices necessary to provide a complete and functioning unit to operate as indicated and connect to field control interfaces indicated.
- B. Dedicated, unit-mounted control panel shall, at a minimum, consist of (1) Allen-Bradley Compactlogix PLC with minimum 10" HMI display screen, and 4 port ethernet switch to allow for communication with existing control system via EtherNet/IP.

- C. Operating controls shall include the following devices and features:
1. Control transformer(s) with fuse protection, as required by manufacturer, to implement requirements indicated. Provide transformer with 25 percent spare capacity.
 2. Set-Point Adjust: Operating and alarm set points shall be field adjustable.
- D. Control Enclosures:
1. NEMA 250, Type 12.
 - a. Provide enclosure with integral vents, fans, heat, and air conditioner as required to automatically control temperature inside enclosure within safe operating limits of devices installed within the enclosure.
 2. Wiring shall be numbered and color-coded to match wiring diagram. Provide a laminated wiring diagram located inside enclosure.
 3. Mounted on deaerator assembly along the Front side of the stand at a location convenient to operator. Provide supplemental steel as required to support panel(s).
 4. Provide hinged full-size door with key lock. Provide common key for all locks.
 5. Enclosure shall consist of multiple sections divided by a partition with a separate hinged door for each section. One section shall house low-voltage controls; other section shall house line voltage controls.
 6. Enclosure shall house the following:
 - a. Control transformers with fuses.
 - b. Labeled terminal strips.
 - c. PLC-based controller(s) to provide control and alarm functions indicated.
 - d. Audible indication of safety alarms.
 - e. Dry Contacts:
 - 1) For interface with chemical feed pump controls.
 - 2) For VFD speed override to 100% during HRSG/boiler overpressure condition.
 7. Face of enclosure shall provide the following:
 - a. Visual indication of operating components and alarms with momentary test push button.
 - b. Visual indication of elapsed run time, graduated in hours.
 - c. Auto/local capability to allow operator to manually operate unit locally.
 - d. Audible alarm silence capability.
 - e. Labels for switches, lights, and displays to provide clear indication of service.
- E. Control Instrument Enclosures: Control instruments and devices that are mounted on the deaerator assembly and cannot be installed inside the control enclosure shall have same or higher level of protection indicated for control enclosures.
- F. Control Cable and Wire:
1. Control cable and wiring shall be numbered and color-coded to match wiring diagram.
 2. Install cable and wiring located outside of enclosure(s) in a metal raceway.

3. Use flexible conduit to make final terminations.
 4. Provide watertight installation for applications exposed to moisture.
- G. Touch-Screen Local Operator Interface: Provide local operator interface through a nominal 10-inch touch-screen graphical color display for setup, monitoring, and data acquisition.
1. Monitoring:
 - a. Pump operating status (on/off).
 - b. Pump lead/lag status (lead/lag position).
 - c. Pump speed for variable-speed pumps (analog value, zero to 100 percent).
 - d. Pump operation failure alarm.
 - e. Pump starts.
 - f. Pump run time.
 - g. Feedwater pump manifold pipe discharge pressure (analog value, gage pressure).
 - h. Steam pressure (local indicator).
 - i. Steam valve open position (analog value, zero to 100 percent).
 - j. Tank water level (analog value).
 - k. Tank high-water-level alarm (digital value).
 - l. Tank low-water-level alarm (digital value).
 - m. Tank low-water-level cutoff alarm (digital value).
 - n. Condensate inlet valve open position (analog value, zero to 100 percent).
 - o. Tank temperature (local indicator).
 2. Control Setup:
 - a. Pump operation (on/off).
 - b. Pump lead/lag operation (lead/lag position).
 - c. Pump speed for variable-speed pumps (analog value, zero to 100 percent).
 - d. Pump manifold pipe discharge pressure set point (analog value, gage pressure).
 - e. Steam pressure set point (analog value, gage pressure).
 - f. Steam valve open position override (analog value, zero to 100 percent).
 - g. Tank water level set point (analog value, adjustable).
 - h. Tank high-water-level alarm set point (digital value).
 - i. Tank low-water-level alarm set point (digital value).
 - j. Tank low-water-level cutoff alarm set point (digital value).
 - k. Condensate inlet valve open position override (analog value, zero to 100 percent).
 - l. Pump speed override for variable-speed pumps during HRSG/boiler overpressure condition.
- H. Existing Control System Interface: Factory install hardware and software to enable system to monitor, control, and display deaerator status and alarms.
1. Hardwired I/O Points:
 - a. Monitoring: On/off status for each pump, failure alarm for each pump, low-water-level alarm, high-water-level alarm, and feedwater temperature.
 - b. Control: On/off operation, on/off operation of each pump, lead/lag position of each pump, feedwater supply pressure set-point adjustment, tank water level set-point adjustment, and HRSG/boiler overpressure operation.

2. Communication Interface: EtherNet/IP communication interface shall enable control system operator to remotely control and monitor deaerator operation from an operator workstation. Control features available, and monitoring points displayed, locally at deaerator control panel shall be available to control system through the interface.
- I. Feedwater Pump Continuous Control Sequence for (3) 50% Pumps:
 1. One or two pumps run continuously (with VFD control) to maintain boiler feedwater discharge header pressure while boiler(s) operates. Electric interlock with boiler control to start lead pump when boiler starts.
 2. Boiler water-level controller modulates feedwater control valve to maintain boiler water-level set point. Valve closes when boiler is off.
 3. Lead and lag pumps alternate to equalize run time.
 4. Lead pump failure automatically starts lag pump.
 5. Feedwater pressure controller controls operating feedwater pump(s) speed and starts and stops multiple pumps, as required, to maintain feedwater pressure set point.
 6. Visual indication of pump on and off status.
 7. Visual indication of pump starts.
 8. Visual indication of pump run time.
 9. Visual indication of pump lead/lag status.
 10. Visual and audible alarm indication of pump failure.
 11. Visual indication of feedwater flow rate.
 - J. Condensate Inlet Control Sequence:
 1. Electric level controller operates electric control valve to maintain tank water-level set point.
 2. Visual and audible alarm indication of low and high tank water level.
 3. Low-water level stops pumps.
 4. Visual indication of makeup water flow rate.
 - K. Existing Condensate Forwarding Pumps Control Sequence: Existing condensate forwarding pumps run continuously while deaerator is operating to maintain discharge header pressure; deaerator water-level controller modulates water-level-control valve; lead and lag pump(s) switch to equalize run time; lag pump operates if lead pump fails; pump failure sounds audible alarm.
 - L. All control loops shall have an Auto/Manual mode whereby:
 1. In Auto mode, the loop algorithm drives the loop output to satisfy the loop setpoint.
 2. In Manual mode, the operator can manipulate the loop out from the local or remote SCADA display screens.
 - M. All controlled devices (such as pumps, on-off valves, etc.) shall have an Auto/Manual mode whereby:
 1. In Auto mode, the device position is driven programmatically by the control system logic.
 2. In Manual mode, the operator can manipulate the device position from the local or remote SCADA display screens.
 - N. The control equipment supplier shall provide, for both the CCS and BMS PLC systems, a data base listing of all PLC-based variables including:

1. Tag name
2. Whether the tag is Controller Scoped or Program Scoped; if the latter, then the path name (e.g., Program:MainProgram.FT_100).
3. Scaling, raw range, engineering units range, engineering units for all analog values.
4. Normal and Off-normal state for all digital values.
5. NOTE: Flags and placeholders that mainly serve the organizational aspects of the logic need not be included.

2.5 ELECTRICAL POWER

- A. Single-Point Field Power Connection: Factory-installed and -wired switches, Variable Frequency Drives (VFDs), transformers, and other electrical devices necessary shall provide a single-point field power connection to unit.
1. Enclosure: NEMA 250, Type 2.
 - a. Enclosure shall have integral vents, fans, heat, and air conditioner as required to automatically control temperature inside enclosure within safe operating limits of devices installed within the enclosure.
 - b. Mounted on deaerator assembly along the Front side of the stand at a location convenient to the Operator. Provide supplemental steel as required to support panel(s).
 - c. Enclosure shall have hinged full-size door with key lock with common key for all locks.
 2. Wiring shall be numbered and color-coded to match wiring diagram. Provide a laminated wiring diagram located inside enclosure.
 3. Install wiring outside of an enclosure in a metal raceway. Make final connections to motors using flexible conduit. Provide watertight installation for applications exposed to moisture.
 4. Field power interface shall be to fused disconnect switch. Withstanding rating of disconnecting means shall protect equipment. Coordinate requirements with field electrical power source.
 5. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker.
 6. Provide each motor with NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection. Provide variable-frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - a. Alternating control as indicated by control sequence for each pump.
 7. Provide transformer with fuses and power wiring to power a 20-A, 120-V duplex receptacle mounted in each control panel for use in connecting analytical and testing equipment.

2.6 FACTORY FINISHES

- A. General:

1. Paint deaerator, using manufacturer's standard procedures, except comply with requirements indicated.
2. Miscellaneous surfaces shall be finished to match continuous surfaces.
3. Manufacturer shall field touch-up or entirely repaint surface finishes, damaged during shipment, to original condition, using original materials and methods.
4. Paint shall be suitable for temperatures encountered on painted surfaces.
5. Requirements indicate minimum quality level. Provide more robust paint system if required to comply with other requirements indicated.

B. Preparation:

1. Follow paint manufacturer's published preparation and application instructions.
2. When paint manufacturer's recommended preparation requirements differ from those specified, use more stringent requirements.
3. Structural steel with visible corrosion shall be sandblasted according to SSPC SP-6 or SSPC SP-10 before applying primer and paint.
4. Before applying a primer and a topcoat, remove oil and grease from surfaces to be coated using clean rags soaked in thinner according to SSPC SP-1.
5. Treat galvanized-steel surfaces that cannot be procured with a phosphatized finish with a phosphate rinse to ensure proper paint adhesion.

C. Primer:

1. Rust-inhibiting, zinc type with a minimum dry film thickness of 2 mils.
2. Provide multiple passes if required to prevent runs.
3. Select a primer that is compatible with substrate and with finish coat.

D. Finish Coat:

1. Finish coat shall be alkyd enamel.
2. Use dry film thickness recommended by paint manufacturer, but not less than 2 mils. Provide multiple passes if required to prevent runs.

E. Paint the following surfaces with primer and finish coat:

1. Base and miscellaneous supports that are not hot-dip galvanized.
2. Carbon steel that is not galvanized.
3. Exterior surfaces of unit exposed to view.
4. Piping and trim.

F. Do not paint aluminum, galvanized-steel, and stainless-steel surfaces.

2.7 CAPACITIES AND CHARACTERISTICS

- A. Nominal Capacity: 100,000 lb/h.
- B. Design Feedwater Flow Rate: 210 gpm.
- C. Steam ('Pegging') Flow Rate: (By Vendor).

- A. High Pressure Return Flow Rate: 5 gpm at 110 psig (assume 0 gpm for capacity rating).
- B. High Pressure Return Temperature: 225°F.
- C. Steam Condensate Flow Rate: 125 gpm.
- D. Steam Condensate Temperature: 170°F.
- E. Makeup Water Flow Rate: 61 gpm.
- F. Makeup Water Temperature: 60°F.
- G. Capacity: Capable of raising temperature of condensate and makeup water to within 2 deg F of saturated steam temperature.
- H. Minimum Working Pressure: 50 psig.
- I. Operating Pressure: 5 psig.
- J. Resultant Oxygen Content: Not more than 0.005 cc/L through an operating range between 5 and 100 percent of full load.
- K. Storage Tank:
 - 1. Tank capacity at normal operating water level: 2,100 gal.
- L. Feedwater Pumps:
 - 1. No. of Pumps: 3.
 - 2. Design Flow Rate: 210 gpm (105 gpm per pump).
 - 3. Design Head Pressure: 460 ftld (190 psig).
 - 4. Minimum Flow Rate: 50 gpm.
 - 5. NPSHR: 7 ftld (max.).
 - 6. Rated Operating Temperature: 227°F.
 - 7. Rated Maximum Temperature: 248°F.
 - 8. Close-off Pressure: 485 psig (minimum).
 - 9. Horsepower: 25 hp.
 - 10. Speed: 3600 rpm.
- M. Deaerator Assembly Single-Point Power Electrical Characteristics:
 - 1. Volts: 480 V.
 - 2. Phase: Three.
 - 3. Hertz: 60.
 - 4. Full-Load Amperes: By Vendor.
 - 5. Minimum Circuit Ampacity: By Vendor.
 - 6. Maximum Overcurrent Protection: By Vendor.
- N. Dimensional Constraints for Equipment:
 - 1. Maximum Width: 7'-0"

2. Maximum Height: Equipment shall be sized appropriately to allow for proper operation and maintenance below existing roof truss with bottom of steel at 21'-6" AFF and bottom of roof deck at 23'-7" AFF. Refer to Project Drawings for roof truss layout and spacing.
3. Single Largest Component: Shall be capable of rigging through 8'-0" Wide x 9'-0" High roll-up door, unless coordinated for rigging through roof during installation of HRSG.

2.8 SOURCE QUALITY CONTROL

- A. Fabricate and label deaerator tanks according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
- B. Factory install and test piping that connects pumps to tanks according to ASME B31.1, "Power Piping."
- C. Factory Tests: Test performance and submit test results on packaged deaerator units, according to ASME PTC 12.3, before shipping to Project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting deaerator performance, maintenance, and operations.
 1. Deaerator location indicated on Drawings is approximate. Determine exact location before roughing-in for piping and electrical connections.
- B. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping to verify actual locations of piping connections before installation of deaerator.
- C. Examine area for suitable conditions where deaerator will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate size and location of base. Cast anchor-bolt inserts into concrete base. Concrete, reinforcement, and formwork requirements are specified with concrete.
- B. Equipment Mounting:
 1. Install deaerator on cast-in-place concrete equipment base. Comply with requirements for equipment bases and foundations specified in Section 033053 "Miscellaneous Cast-in-Place Concrete."
 2. Comply with requirements for vibration isolation and seismic-control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

- C. Install all control valves, manual valves, pressure/temperature indicators/gauges, etc. within view and reach of access platform(s) to allow for easy/safe operation of the deaerator by Operations Personnel. Coordinate all platform railings and access ladders with both factory and field-mounted accessories while maintaining the minimum required clearances for each of the control panels, electrical cabinets, VFDs, etc.
- D. Install deaerator to permit access for service and maintenance.
- E. Where installing piping adjacent to machine, allow space for service and maintenance.
- F. Support piping independent of equipment.
- G. Install all parts and materials not factory installed.
- H. Assemble and install deaerator trim, components, and accessories that are not factory installed.
- I. Install control and electrical devices furnished with deaerator that are not factory mounted.
- J. Install control and power wiring to field-mounted control and electrical devices furnished with deaerator that are not factory installed.
- K. Perform cleaning procedures according to manufacturer's written instructions after completion of hydrostatic testing and before performing other field tests. Following cleaning procedures, deaerator shall be washed and flushed until water leaving deaerator is clear.
- L. Protect deaerator from corrosion.
 - 1. Before filling with water, protect by dry storage method recommended by manufacturer.
 - 2. After filled with water, protect by wet storage method recommended by manufacturer.
- M. Chemical Treatment: Quality of water in deaerator shall be maintained by a professional water treatment organization that shall provide on-site supervision to maintain the required water quality during periods of storage, operating, standby, and test conditions.
- N. Install flow meter mounted in feedwater discharge manifold pipe and positioned to measure and display flow supplied by deaerator to boilers. Accuracy within 2 percent of actual reading when measured across design to minimum flow range. Flow meter shall provide analog value to existing control system for incorporation into existing display screens.
- O. Install sample cooler, with needle valve for each connection. Constructed of Type 316 stainless steel.
- P. Furnish & install deaerator insulation and jacketing per the mechanical insulation specification prior to completion.

3.3 PIPING CONNECTIONS

- A. Steam and condensate piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Connect steam and condensate piping to tank flanges with shutoff valves and unions or flanges at each connection.
- C. Connect condensate drains, pump-discharge piping, vents, overflow drains, condensate inlet, steam supply, and cooling water piping.
 - 1. Extend overflow drains to floor drain.
 - 2. Extend vent piping to outside and terminate with manufacturer-approved cap furnished with deaerator.
 - 3. Install piping from safety valves and drip-pan elbows. Extend piping from safety valves and terminate to vent outdoors. Terminate vent piping with 45-degree miter to reduce outlet velocity. Extend piping from drip-pan elbow drain to nearest floor drain.
 - 4. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- D. Hot equipment drains connected to sanitary drainage system shall be cooled before discharging into the system if required to comply with more stringent of governing code requirements and requirements indicated.
 - 1. Provide a temperature-controlled, non-potable, domestic cold water source to cool hot equipment drains to deliver a discharge temperature of less than 140°F.
- E. Connect chemical treatment piping to deaerator chemical treatment connections with check valve and isolation valve.
- F. Where installing piping adjacent to deaerators, allow space for service and maintenance.

3.4 ELECTRICAL POWER CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.5 CONTROLS CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring between deaerators and other equipment to interlock operation as required to provide a complete and functioning system.
- C. Connect control wiring between deaerator control interface and existing SCADA system via EtherNet/IP for remote monitoring and control of deaerator.

3.6 INSULATION

- A. Insulation shall be provided by insulating blanket of the mineral wool type and provided with aluminum jacketing.

- B. Minimum insulation thickness shall be 4" thick.
 - 1. Insulation thickness/type shall result in an external deaerator temperature of less than 140°F.
- C. Insulation shall be provided in no less than two layers with staggered joints.

3.7 EXISTING DEAERATOR(S) SCOPE

- A. The Contractor shall be responsible for the demolition and complete removal of the existing deaerator located within the cogeneration room, per the project documents.
- B. The Contractor shall be responsible for draining & drying the existing deaerator located within the boiler room and ensure proper disconnect and isolation from the existing systems to confirm the unit has been completely disconnected and made safe. All services/interconnections shall be demolished back to source including instrumentation and electrical power sources to associated boiler feedwater pumps, etc.
 - 1. Associated chemical treatment equipment shall be removed from service, as required.
 - 2. Boiler feedwater pumps shall be completely drained.
 - 3. New valves, gaskets, spectacle blinds, etc. shall be provided, as necessary, to allow for tight shutoff of each service to/from the existing unit. Replace existing valves, gaskets, etc., as required, to prevent any leakage into/out of the deaerator from other interconnected sources.
 - 4. This work shall be closely coordinated with the College and their Operations staff a minimum of 24 hours in advance of performing any work as it is critical the existing boiler plant remain operational throughout construction to provide the steam loads required to meet the campus demands.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Inspect field-assembled components and equipment installation, including piping and electrical connections, for compliance with requirements.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Verify bearing lubrication.
 - 4. Verify proper motor rotation.
 - 5. Test Reports: Prepare a written report to record the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Deaerator will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

3.9 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Set condensate inlet-level controls.
 - 3. Set operating controls.
 - 4. Verify safety controls.
 - 5. Verify lubrication.
 - 6. Verify proper motor rotation.
 - 7. Start pumps according to manufacturer's written instructions.
- B. Report: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Initial findings.
 - 3. Final results.
 - 4. Corrective action taken to achieve compliance with requirements indicated.
 - 5. Date of testing.
 - 6. Name and contact information for person performing testing.

3.10 ADJUSTING AND CLEANING

- A. Adjust initial temperature and pressure set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges.
- C. Clean strainers.

3.11 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain deaerators.
- B. Video training sessions, and provide electronic copy of video to Owner.

END OF SECTION 235316

SECTION 235800 – HEAT RECOVERY STEAM GENERATOR (HRSG)

PART 1 - GENERAL REQUIREMENTS

1.1 GENERAL

- A. This specification covers the minimum requirements for the construction features, materials, fabrication, inspection, and preparation for shipment of "O-type" (Slant style) shop-assembled, Heat Recovery Steam Generator (HRSG) and associated equipment complete with all necessary appurtenances, controls and auxiliary equipment mounted to the maximum practical extent (allowed by shipping clearances) as an integral unit on a steel base so as to make a complete self-contained assembly.
- B. The equipment will generate high pressure steam to be utilized for heating and cooling of The College of New Jersey's campus in Ewing, NJ.
- C. The HRSG is located indoors in an existing cogeneration facility located at 2000 Pennington Road, Ewing NJ.
- D. Refer to Appendix A for Gas Turbine Data
- E. Refer to Appendix B for site conditions.
- F. Refer to Appendix C for overall plot space and available footprint for equipment specified herein.
- G. Refer to Appendix D - Volumetric Composition of the Turbine Exhaust Gas for the Existing Solar® Taurus T60-7300
- H. Refer to Appendix E - Energy Recovery International (ERI) drawings for Heat Recovery Steam Generator (HRSG)

1.2 CODES AND STANDARDS

- A. All work and materials furnished will conform to the highest industry standards for material and workmanship, and shall be designed and fabricated in accordance with, but not limited to:
 - 1. ANSI American National Standards Institute
 - 2. ASME American Society of Mechanical Engineers
 - Boiler Pressure Vessel Code (BPVC) Section I
 - Boiler Pressure Vessel Code (BPVC) Section II
 - B31.1 - Power Piping
 - PTC 4 - Performance Test Code Fired Steam Generators
 - 3. AWS American Welding Society
 - 4. ASTM American Society for Testing Materials
 - 5. AISC American Institute for Steel Construction
 - 6. IBC International Building Code
 - 7. SSPC Structural Steel Painting Codes

8. NFPA National Fire Protection Association
- NFPA 85 – Boiler and Combustion System Hazards Code
9. OSHA Operators Safety and Hazards Association

- B. All equipment shall comply with federal and state laws and regulations governing the location where the equipment is to be installed.

1.3 QUALITY ASSURANCE

- A. It is the responsibility of the Contractor and equipment Vendor to ensure that the completed work, and that of their sub-vendors, conforms in all respects with this specification including the applicable codes and standards. If a conflict within this specification or between this specification, the inquiry or purchase order, data sheets, drawings, and other supplemental specifications is discovered, the Contractor and/or equipment Vendor shall identify the conflict in writing for clarification by the Owner.
- B. The equipment shall, as a minimum, be in strict compliance with the requirements of this specification and shall be the manufacturer's standard product unless specified otherwise. Additional equipment features, details, accessories, appurtenances, etc. which are not specifically identified but which are a part of the manufacturer's standard product, shall be included in the equipment being furnished.
- C. All manufacturing and installation procedures regarding the HRSG's pressure vessel & associated Boiler External Piping (BEP) within the ASME Boiler Pressure Vessel Code (BPVC) Section I boundary shall be installed per all applicable code requirements and shall require code symbol stamping, ASME data forms and authorized inspection. Refer to P&IDs for additional requirements as well as indication of ASME BPVC Section I boundary.
- D. The equipment shall be new and fabricated from new materials and shall be free from defects in materials and workmanship.
- E. During installation of the HRSG and its associated equipment the contractor/equipment vendor shall bring any equipment/material defects or flaws that are discovered and that could cause a potential operations concern to the Owner's attention immediately. The Owner shall then determine if the condition/concern warrants repairs or replacement.
- F. The equipment must fit within the allocated space, leaving ample allowance for maintenance and cleaning, and must leave suitable space for easy removal of all necessary appurtenances.
- G. Submittals – Contractor shall submit the following certified drawings and data for review:
 1. Welding procedures
 2. Manufacturer's ASME data reports
 3. Mill Test Reports
 4. Hydrostatic Test Report
 5. Storage Requirements (if applicable)

1.4 PROPOSAL REQUIREMENTS

- A. The equipment furnished shall be, as a minimum, in accordance with the requirements of this Specification and shall be the manufacturer's standard product with any added features needed to comply with the design and performance requirements. Additional or better features which are not specifically prohibited, but which are a part of the manufacturer's standard product, shall be included in the package being furnished.
- B. The Vendor's proposal shall include, at a minimum, the following information:
1. General Description of Heat Recovery Steam Generator and auxiliary equipment.
 2. Description and make of combustion controls, combustion turbine interlock control, feedwater flow control, and flame safety control systems to be furnished by the Vendor.
 3. Proposal shall include, at a minimum, the following commercial details:
 - a. Equipment Lead Time/ Delivery Schedule
 - b. Priced Spare Parts List
 - c. Warranty
 4. Heat recovery steam generator performance for the fired and unfired scenarios for the turbine operating scenarios provided in Appendix A.
 5. Water quality requirements to be maintained for proper boiler operation.
 6. Vendor to indicate guarantees within the proposal.
 7. Any deviations or exceptions taken to the specification must be listed or a statement of compliance with the specification shall be provided.
 8. General Arrangement Drawing showing equipment arrangement, overall dimensions, and foundation loading of all equipment proposed.
- C. The Vendor shall identify any exceptions to this specification or its references and include detailed justification. The Vendor shall notify Owner of any modifications to his standard design, which are required in order to meet this specification.
- D. The Contractor's proposal shall include, at a minimum, the following information:
1. Reference list containing a minimum of three (3) similar projects. List shall include a contact person's name and phone number, locations of installation, application of equipment, and years installed.
 2. Installation description, and estimated crew size and man-hours by craft for field installation. List installation equipment and tools required by installer.
 3. Detailed description of all materials to be used.
- E. The Contractor shall identify any exceptions to this specification or its references and include detailed justification. The Contractor shall notify Owner of any modifications to his standard design, which are required in order to meet this specification.

1.5 SUBSTITUTIONS / MODIFICATIONS

- A. If the Bidder recommends proven alternate cost reduction equipment or work practices, the alternate(s) will be considered provided that additional information is submitted for evaluation of the alternate(s) or substitution(s). Additional information should include a complete

description of the alternate(s), installation requirements, manpower, schedule, comparison of operation and maintenance costs, and construction or erection procedures.

- B. The Bidder must submit in writing to the Owner's Engineer any request for a proposed deviation, omission, modification, or substitution to this specification for evaluation no later than ten (10) days prior to bid date.
- C. Technical data, drawings, product samples, and complete data substantiating compliance of proposed substitution with these specifications shall accompany a request for any substitution.

1.6 ACTION SUBMITTALS

- A. The Contractor shall submit all submittals for approval by the Engineer. Under no circumstances shall the Contractor install any materials until the Engineer has made final approval on the submittals.
- B. Shop Drawings - Shop drawings shall be submitted to the Engineer and shall consist of the following information:
 - 1. Vendor shall submit document list, project datasheet, boiler performance, shipping sketch.
 - 2. General Arrangement Drawing showing arrangement, overall dimensions, and foundation loading of all equipment.
 - 3. P&ID including all instruments provided as part of the equipment package.
 - 4. Schematic wiring diagram with SAMA logic of the burner management system and control narrative of boiler control system showing all components, interlocks, etc. Schematic wiring diagram shall clearly identify factory wiring and field wiring by others.
 - 5. Vendor shall provide installation details and system assembly drawings with detailed rigging instructions.
 - 6. Provide two (2) Operating and Maintenance manuals including approved submittal drawings, instructions for maintenance and inspections, complete spare parts list, and ASME Documentation and other certificates.

1.7 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plan and elevation views indicating equipment Manufacturers' service clearances, structure and base attachment, piping, power, controls, etc. Each view shows a screened background with the following:
 - 1. Column grids, beams, columns, and concrete housekeeping pads.
 - 2. Room layout with walls, floors, and roofs, including each room name and number.
 - 3. Equipment and products of other trades that are located in vicinity of HRSG and are part of final installation, such as lighting, fire-suppression systems, and plumbing systems.
- B. Seismic Qualification Certificates: For HRSG, accessories, and components, from Manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- C. Installation instructions.
- D. Source quality-control reports.
- E. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Manuals.
- B. Spare Parts List: Recommended spare parts list with quantity for each.
- C. Touch-up Paint Description: Detailed description of paint used in application of finish coat to allow for procurement of a matching paint.
- D. Instructional Videos: Including those that are prerecorded and those that are recorded during training.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Tool kit to include the following:
 1. A tool kit specially designed by HRSG Manufacturer for use in servicing HRSG furnished.
 2. Special tools required to service HRSG components not readily available to Owner service personnel in performing routine maintenance.
 3. Lockable case with hinged cover, marked with large and permanent text to indicate the special purpose of tool kit, such as "Boiler Tool Kit." Text size shall be at least 1 inch high.
 4. A list of each tool furnished. Permanently attach the list to underside of case cover. Text size shall be at least 0.5 inch high.

- 1.10 Touch-up Paint: 32-oz. container of paint used for finish coat. Label on outside of container shall have a detailed description of paint to allow for procurement of a matching paint in the future.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be responsible for the timely delivery of the equipment to the jobsite.
- B. Equipment shall be unloaded, handled, and stored in accordance with the Manufacturer's handling and storage instructions.

1.12 WORK BY OTHERS

- A. The following work is to be performed by others or incorporated as existing equipment to remain, unless otherwise specified in the Project Documents or specifically noted below:
 - 1. Gas Turbine
 - a. Exception, interlock controls to be coordinated with this existing equipment.
 - 2. Duct Burner
 - a. Exception, new BMS panel to be provided for this existing equipment.
 - 3. Site Preparation.
 - 4. Foundations
 - a. Exception, modifications to be provided, as required.
 - 5. CEMs
 - a. Exception, sampling line to be disconnected/ reconnected upon HRSG installation.

1.13 WARRANTY REQUIREMENTS

- A. All equipment is to be guaranteed against defects in materials and/or workmanship for a period of 12 months from date of start-up, or 18 months from date of shipment; whichever comes first.
- B. Contractor/equipment Vendor shall provide a five (5) year warranty for all materials and work associated with the HRSG pressure parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Equipment must be furnished only by a qualified Manufacturer. The qualified Manufacturer must have a minimum of fifteen (15) years' experience providing similar equipment in size and scope to this Project. The Manufacturer shall submit experience list upon request by Customer.
- B. Basis of Design: Cleaver-Brooks (ERI).
- C. Acceptable Manufacturers are listed herein.
 - 1. Cleaver-Brooks, Inc.
 - 2. Rentech Boilers
 - 3. Victory Energy

2.2 BOILER DESIGN & OPERATING CONDITIONS

A. Boiler Operating Conditions

1. Design Pressure - psig: 150
2. Fired Steam Capacity – lb/hr: 25,000
3. Unfired Steam Capacity – lb/hr: 42,500
4. Operating Pressure – psig: 100
5. Operating Temperature - °F: Saturated
6. Steam Purity – ppm TDS 1
7. Steam Quality - % dry steam: 99.5
8. Feedwater Temperature - °F: 220
9. Duct Burner Heat Input – mbtu/hr (HHV) (Natural Gas): 27.5
10. Flue-gas pressure drop - inH₂O: < 8

B. Design Exhaust Information

1. Refer to Appendix D - Volumetric Composition of the Turbine Exhaust Gas for the Existing Solar® Taurus T60-7300

C. Noise Sound Levels shall be 85 dBA max and based on ABMA test code for packaged boilers measured @ 4 ½ feet vertically above the bottom of the base and 3'0" horizontally in front of the end of the duct burner or front surface of control cabinet. Sound levels dBA on the scale in reference to 0.0002 microbars.

2.3 BOILER CONSTRUCTION

- A. Each heat recovery steam generator shall consist of a two-drum, Slant style, shop-assembled, package type watertube boiler assembly.
- B. Flue gas shall transition from horizontal flow and to vertical flow within the casing of the Slant boiler / evaporator.

2.4 DRUMS

- A. Steam Drum – shall be 42" inside diameter steam plate of 70,000 U.T.S., fusion welded, x-rayed, and stress relieved. All internals shall be installed in a manner as to allow their easy removal and replacement for cleaning and maintenance. Internals shall be provided which will insure good distribution of incoming feedwater and steam quality in the generated steam.
- B. Steam Drum shall be provided with the following connections:
 1. Main Steam Outlet
 2. (2) Safety Valves
 3. Boiler Feedwater
 4. Water Column
 5. Drum Level
 6. Chemical Feed
 7. Continous Blowdown
 8. Drum Vent
 9. Auxilary Low Water Cut-out

- C. Water (Mud) Drum – shall be 30” OD of either fusion welded plate or seamless steel pipe. The water drum shall have suitable internal baffle or angle to insure proper blowdown of boiler.
- D. Water Drum shall be provided with the following Connections
 - 1. Intermittent Blowdown
- E. Each steam and water drum shall be provided with two (2) hinged manhole openings (12” x 16” minimum) to assure visibility and ventilation during inspection and maintenance. Each manhole opening shall be complete with manhole plate, yoke, nuts, bolts, washers, and gaskets.
- F. No part of the boiler drums shall be directly exposed to furnace radiation. Refractory shall be utilized to protect from radiant heat.
- G. Drums shall include a corrosion allowance of 0.125”.
- H. All connections larger than 1.5" shall be flanged.
- I. Connections less than or equal to 1.5” shall be flanged or welded.
- J. Tube to drum connections shall be rolled and seal welded. Compression fittings or alternate tube to drum configurations shall not be accepted. (optional)

2.5 BOILER CONVECTION SECTION

- A. All tubes shall be 2" OD, electric resistance welded, and shall be designed and arranged to provide for natural circulation in the proper direction at all loads. Tubes of variable diameter, such as swaged tubes, shall not be permitted.
- B. Tubes shall be oriented on an inclined plain to maximize the heating surface within a given footprint.
- C. Tubes immediately downstream of the duct burner shall be bare and shall not include extended finning.
- D. No tube shall enter the lower drum below the horizontal drum centerline. Tubes shall not have any reverse bends or "pockets" which would prevent complete drainage of the boiler through the lower blowoff opening.
- E. Each tube hole shall be serrated to assure the tightest possible mechanical joint.
- F. All tubes shall be a minimum of 0.105” wall thickness.
- G. Tube rows immediately downstream of the duct burner shall be bare tube.

2.6 DOWNCOMERS

- A. Downcomers shall be of sufficient quantity and size for adequate circulation under all operating scenarios.

- B. Downcomers shall be completely external to the gas path.
- C. All downcomers shall include vortex breakers.
- D. No downcomers shall enter the steam drum above the normal water level.

2.7 CASING, SETTING, AND INSULATION

- A. The external casing shall be 12-gauge steel and shall completely enclose the unit with the exception of the four drum heads. The drum heads shall be insulated in the field by others. The steam drum shall be insulated and cased with 12-gauge steel.
- B. The average surface temperature of the casing shall not exceed 50°F over ambient temperature with a surface wind velocity of two feet per second while the boiler is operating at full capacity.
- C. Casing shall include internal insulation of sufficient thickness obtain the required average casing temperature.
- D. Refractory shall not be utilized within the heat recovery steam generator.
- E. All insulation shall include a protective liner of adequate material to withstand the design temperature including luminous radiation from combustion sources.
- F. Insulation over the top of the steam drum is to be a minimum of 3 inches thick 1000°F insulating blanket of the fiber glass or mineral wool type.
- G. A welded heavy beam and channel boiler base shall support the steam generating equipment and uniformly distribute the loading over the foundation area.
- H. The exterior steel surfaces of each unit shall be completely cleaned by solvent cleaning, scraping, or grinding and have one (1) coat each of high heat resistant primer and finish coat.

2.8 TRIM AND INSTRUMENTATION

- A. Each unit shall be furnished with the following boiler trim and instrumentation which shall be in accordance with ASME Code requirements and conforming to the best standards and practice.
- B. All flow transmitters shall include at a minimum a three-valve manifold.
- C. All pressure transmitters and gauges for steam and water service shall include at a minimum a two valve manifold.
- D. Boiler Trim and Instrumentation
 - 1. This equipment shall be factory-mounted, complete with integral connecting piping, valves, and fittings. All valves and control apparatus are to be designed for the specific application for which they are utilized in full compliance with the regulatory codes specified above. Drain lines, as applicable, shall terminate with a valve 5 feet above operating floor level. If clearances do not permit shipment of all apparatus mounted on the unit, the subassemblies affected can be shipped loose for field mounting by others.

- a. Two (2) Drum Safety Valves
- b. Two (2) Drum Safety Valve Drip-pan Elbows
- c. One (1) Drum Vent Valve
- d. One (1) drum pressure transmitter and pressure gauge.
- e. One (1) high pressure switch and one (1) high-high pressure switch
- f. One (1) Drum Level Transmitter
- g. One (1) auxiliary low water cut-out
- h. One (1) Water Column complete with one (1) gauge glass and one (1) low level probe
- i. One (1) remote level indication for control room with local indication
- j. Continuous Blowdown: One (1) angled stop valve, conductivity probe, automated metering valve with bypass
- k. Chemical Feed: One (1) angled stop valve and one (1) check valve
- l. Intermittent Blowdown: One (1) stop and one (1) throttling valve

E. STEAM TRIM AND INSTRUMENTATION

1. Trim shall be made into subassemblies including necessary piping, fittings, etc. for field mounting by others.
 - a. Non-return Valve
 - b. Spool piece with drain valve
 - c. Main steam stop Valve
 - d. Steam Pressure Transmitter
 - e. Steam temperature transmitter

F. FEEDWATER TRIM AND INSTRUMENTATION

1. Trim shall be made into subassemblies including necessary piping, fittings, etc. for field mounting by others.
 - a. Feedwater Flow Element and transmitter
 - b. One (1) feedwater control valve station including one (1) feedwater control valve, two (2) isolation valves, one (1) bypass valve, and drain valves
 - c. One (1) feedwater stop valve and one (1) feedwater check valve
 - d. One (1) feedwater temperature transmitter
 - e. One (1) post economizer feedwater temperature transmitter

G. ECONOMIZER TRIM AND INSTRUMENTATION

1. Trim shall be made into subassemblies including necessary piping, fittings, etc. for field mounting by others.
 - a. One (1) vent valve and one (1) drain valve
 - b. One (1) inlet and one (1) outlet temperature gauge
 - c. One (1) inlet isolation, one (1) bypass, one (1) outlet isolation valve, and one (1) safety relief valve

H. FLUE GAS TRIM

1. One (1) inlet pressure transmitter

2. One (1) inlet temperature transmitter
3. One observation port per duct burner element with a minimum of two and one observation port at the furnace exit viewing the heat transfer tubes at the exit of the furnace
4. Two (2) furnace temperature transmitters
5. One (1) economizer inlet and one (1) economizer outlet temperature transmitter

2.9 ECONOMIZER

- A. Refer to Exhaust Stack Economizer Specification #235830.

2.10 HRSG CONTROL SYSTEM

- A. A control panel will be provided and mounted within a freestanding panel.
- B. The combustion and feedwater controls shall consists of one (1) PLC based controller mounted and wired in the boiler control panel.
- C. Duct burner firing rate control shall be controlled via the drum pressure transmitter.
- D. Turbine Interlock Controls shall be provided to prevent operation of the HRSG and/or duct burner without the Combustion Turbine Generator (CTG) in steady operation.
- E. Feedwater Controls.
 1. A three element feedwater control system shall control the drum level.

F. BURNER MANAGEMENT SYSTEM

1. Vendor to provide a complete package pre-wired and tested burner management system for single fuel (natural gas).
2. The BMS shall be comprised of hardwired relay contacts, a Programmable Logic Controller (PLC) and a flame detection system. The hardwired relay contacts shall provide safety interlocks, control trip functions and serve as input/output interface between the PLC and selected field devices. The PLC shall be manufactured by Allen-Bradley, or Approved Equal, with Ethernet communications capabilities to HRSG and Owner's Balance of Plant (BOP) Control System. A minimum of 20% spare analog and discrete I/O shall be provided. The BMS shall include a Human Machine Interface (HMI). The HMI shall be manufactured by Allen-Bradley, or Approved Equal.
3. The BMS control panel shall include a flame scanning system to properly shutdown the burner system in the event of pilot or main flame failure during duct burner operation. The flame scanners shall be mounted with an adjustable base joint to allow optimal flame sighting and shall be pre-wired to local panel mounted on the duct burner assembly. The flame scanners shall be air purged and properly cooled to protect them from excessive heat and debris.
4. The flame scanner(s) shall detect only flames of sufficient intensity to safely light or maintain each duct burner element.
5. The BMS shall shut down the duct burner in the event of power failure or failure of the electrical supply to the BMS.
6. An audible alarm shall be provided to signal any BMS shutdown.

7. The BMS control panel shall include an emergency stop pushbutton.
8. The BMS panel shall have as a minimum the following displays or indicating lights on the panel:
 - a. Power on
 - b. Limits complete
 - c. Purge in progress
 - d. Purge complete
 - e. Pilot Valves Energized.
 - f. Main Gas Valves Energizer (Gas Fuel Only)
 - g. Flame Detected
9. The BMS shall have as a minimum the following safety interlocks to insure safe startup of the burner.
 - a. Low Exhaust Gas Pressure Switch
 - b. Low Fuel Gas Pressure Switch
 - c. High Fuel Gas Pressure Switch
 - d. Low Scanner Air Pressure Switch
 - e. High Combustion Chamber Temperature Switch
 - f. Low Instrument Air Pressure Switch
 - g. Position Switch on Main Downstream Fuel Gas Safety Shutoff Valve
 - h. Low Fire Switch on the Main Fuel Gas Flow Control Valve
 - i. Combustion Turbine Generator (CTG) Run Status
10. The BMS shall be shipped fully assembled and factory tested. All field terminations shall be wired to numbered terminal blocks. All wiring shall be in accordance with NFPA 70 (NEC).

2.11 PLANT MASTER

- A. Vendor to provide a complete packaged pre-wired and tested plant master control.
- B. The Plant Master shall control the boilers in unison modulation.

2.12 STACK

- A. Existing exhaust stack to be re-used. Refer to Project Drawings for additional requirements.

2.13 DUCTING / BREECHING / SUPPORT STRUCTURE

- A. Vendor to provide inlet hot-to-cold expansion joint
- B. Vendor shall provide a combustion chamber complete with a 24" x 24" access door, observation ports, and all required connections for testing and measurements.
- C. Vendor to provide all necessary breeching between the boiler and stack with necessary gasket material.

- D. Vendor to provide all necessary structural supports for the ducting, equipment, and stacks.
- E. Access doors shall be provided between equipment to allow for proper maintenance.
- F. Expansion joints as needed to allow for expansion of equipment.
- G. Support structures shall be bolted to allow for ease of installation at site. Welded connections shall be minimized.
- H. Refer to Turbine Exhaust Duct Specification #235840.

2.14 PLATFORMS AND LADDER

- A. Vendor to provide a steam drum length platform with support clips and necessary ladders.
- B. Vendor to provide access platforms and ladders to each end of the steam drum.
- C. Vendor to provide access platforms and ladders to economizer.
- D. Platforms and ladders shall be hot dipped galvanized.
- E. Platform and ladders connections shall be bolted to allow for ease of installation at site. Welded connections shall be minimized.

2.15 SPARE PARTS

- A. Vendor shall provide an itemized priced spare parts list with proposal.
- B. Vendor to include two additional sets of drum manway gaskets, additional gauge glass, and additional observation port lenses.

PART 3 - EXECUTION

3.1 GENERAL

- A. General Requirements
 - 1. All service outages shall be required to be coordinated with the Owner in advance of any scheduled work. Refer to General Notes drawing (G-001) for additional requirements.
 - a. Temporary relocation of fire/smoke detector for rigging, demolition, etc. shall be closely coordinated with the Owner well in advance of scheduled work.
 - 2. Contractor shall be responsible for re-routing all existing services prior to the rigging/removal of new/existing equipment.

3.2 WARRANTY

- A. All equipment is to be guaranteed against defects in materials and/or workmanship for a period of 12 months from date of start-up, or 18 months from date of shipment; whichever comes first.
- B. 5-year pressure part and burner proprietary parts warranty.

3.3 SHOP TESTS

- A. Prior to shipment, the vendor shall perform the following tests as applicable to the steam generating units:
 - 1. Before being enclosed in the setting, the pressure vessels shall receive a hydrostatic test as required by Section 1 of the ASME Boiler and Pressure Vessel Code. The manufacturer shall furnish properly executed ASME Manufacturer's Data Sheets as required by ASME code.
 - 2. Before the application of insulation and casing, the unit(s) shall be given an enclosure air tightness test. The air test pressure shall be 2 inches W.G. above the predicted maximum furnace operating pressure. The air shall be admitted to the unit(s) until the test pressure is reached, and then the unit sealed. If the pressure drop does not exceed 5.0 inch W.G. in ten minutes, the unit(s) will considered satisfactorily tight.
- B. Prior to shipment, the vendor shall perform the following tests as applicable to the control system:
 - 1. The vendor shall perform a Factory Acceptance Test (FAT) on the Burner Management System and Combustion Control System.

3.4 INSTALLATION

- A. Install equipment in strict compliance with manufacturer's installation instructions.
- B. Install equipment in strict compliance with state and local codes and applicable ASME and referenced standards.
- C. Maintain manufacturer's recommended clearances around sides and over top of equipment.
- D. Install components that were removed from equipment for shipping purposes.
- E. Install components that were furnished loose with equipment for field installation.
- F. Provide all interconnecting electrical control and power wiring.
- G. Provide all vent and service piping.
- H. Provide all piping for boiler pipe connections.

3.5 PRE-COMMISSIONING / STARTUP / COMMISSIONING

- A. The boiler manufacturer shall furnish the services of a company-trained engineer for a minimum period of 20 working days to assist and instruct the owner's operating personnel in the boiler out, starting up, adjustment and operation of boiler and firing equipment and all other equipment furnished by the boiler manufacturer. All fuel, water, and power required during startup, adjustment, and operating of equipment will be furnished by the Owner. All boil-out chemicals and labor required during startup, adjustment, and operating of equipment will be furnished by the Contractor. Additional time shall be quoted at a per diem rate. Rates to be provided as part of the vendor's proposal.
- B. All adjustments to boiler, duct burner controls, and boiler control system shall be performed by the manufacturer's authorized service requirements.
- C. Startup-Up Services
 - 1. Perform boil-out once the hydrotest has been successfully completed and data reports signed off. Furnish boil-out chemicals required to complete this process.
 - 2. Commissioning
 - a. Check all safety devices are operational
 - b. Stroke all dampers and calibrate as required
 - c. Establish low fire (100°F per hour)
 - d. Increase to operating pressure
 - e. Commence tuning duct burner through the complete firing range of boiler
 - f. Adjust set points in control system and check repeatability

END OF SECTION 235800

APPENDIX A

HRSG Performance For Gas Turbine Data

Fuel Gas Performance

Case Identifier		1	2	3	4	5
Turbine Fuel						
Turbine Exhaust Flow	lb/hr					
Turbine Exhaust Temp.	°F					
Ambient Temperature	°F					
Turbine Load	%					
N ₂	% vol.					
O ₂	% vol.					
CO ₂	% vol.					
H ₂ O	% vol.					
SO ₂	% vol.					
Ar	% vol.					
NO _x	ppm _{vd} @ 15% O ₂					
CO	ppm _{vd} @ 15% O ₂					
VOC	ppm _{vd} @ 15% O ₂					
HRSG Data						
Steam Flow	lb/hr					
Steam Temp.	°F ± 10°F					
Steam Pressure (NRV)	psig					
Steam Drum Pressure	psig					
Spray Water Flow	lb/hr					
Feedwater Flowrate	lb/hr					
Feedwater Temperature	°F					
Gas Inlet Temperature	°F					
Boiler Outlet Temperature	°F ± 10°F					
Gas Exit Temp	°F ± 10°F					
Blowdown	%					
Pinch	°F					
Approach	°F					
Total Gas ΔP	in. WC					
Burner Data						
Duct Burner Fuel						
Flame Temp	°F					
Burner Duty – HHV	mmbtu/hr					
Burner Duty – LHV	mmbtu/hr					
Products of Combustion						
N ₂	% vol.					
O ₂	% vol.					
CO ₂	% vol.					
H ₂ O	% vol.					
SO ₂	% vol.					

*Items highlighted in yellow shall be guaranteed.

Liquid Fuel Performance

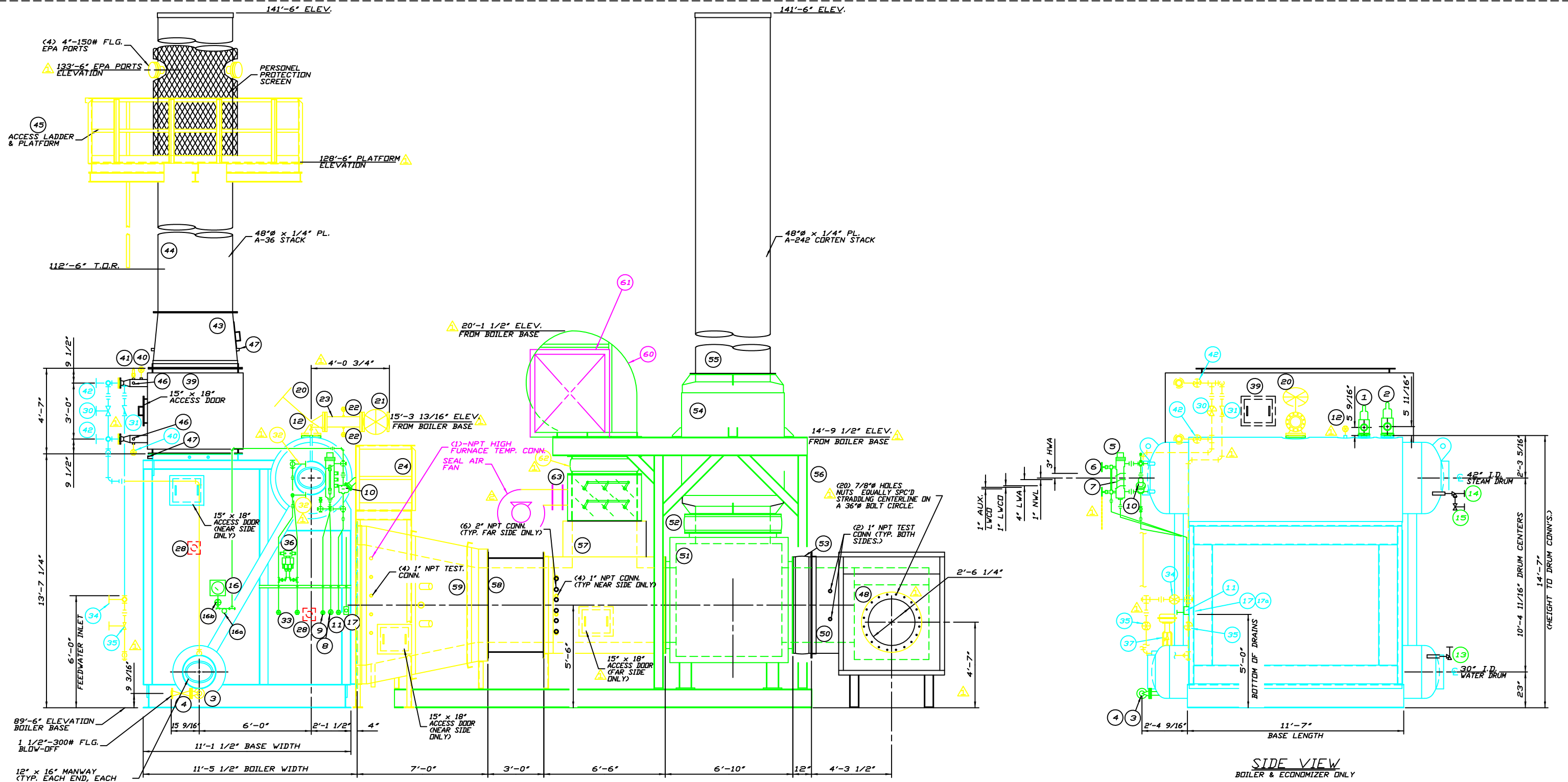
APPENDIX B

Site and Utility Data for Site Conditions

Site Location:	TBD, NE USA
Site Elevation:	0 FASL
Atmospheric Pressure:	14.696 psia
Burner Location:	Outdoors
Control Panel Location:	Outdoors
Ambient Temperature & Combustion Air Temperature / Relative Humidity:	
Maximum:	100°F / 70%
Design:	59°F / 60%
Minimum:	32°F / 50%
Indoor Temperature / Relative Humidity:	
Maximum:	100°F / 70%
Design:	59°F / 60%
Minimum:	32°F / 50%
Outdoor Instrument Temperature:	
Maximum:	100°F / 70%
Design:	59°F / 60%
Minimum:	32°F / 50%
Electrical:	
Motors < 5 HP:	480 V / 3 Ph / 60 Hz
Motors ≥ 5 & < 200 HP:	480 V / 3 Ph / 60 Hz
Motors ≤ 200 HP:	480 V / 3 Ph / 60 Hz
Enclosures Rating:	
Junction Box & Wiring:	NEMA 4
Control Panel:	NEMA 4
Wiring:	NEMA 3R
Area Classification	
Junction Box & Wiring:	Non-Hazardous
Control Panel:	Non-Hazardous
Wiring:	Non-Hazardous

APPENDIX C

Plot Plan and Space Requirements for Overall Plot Space and Available Footprint For Equipment Specified Herein



FRONT VIEW

SIDE VIEW
BOILER & ECONOMIZER ONLY

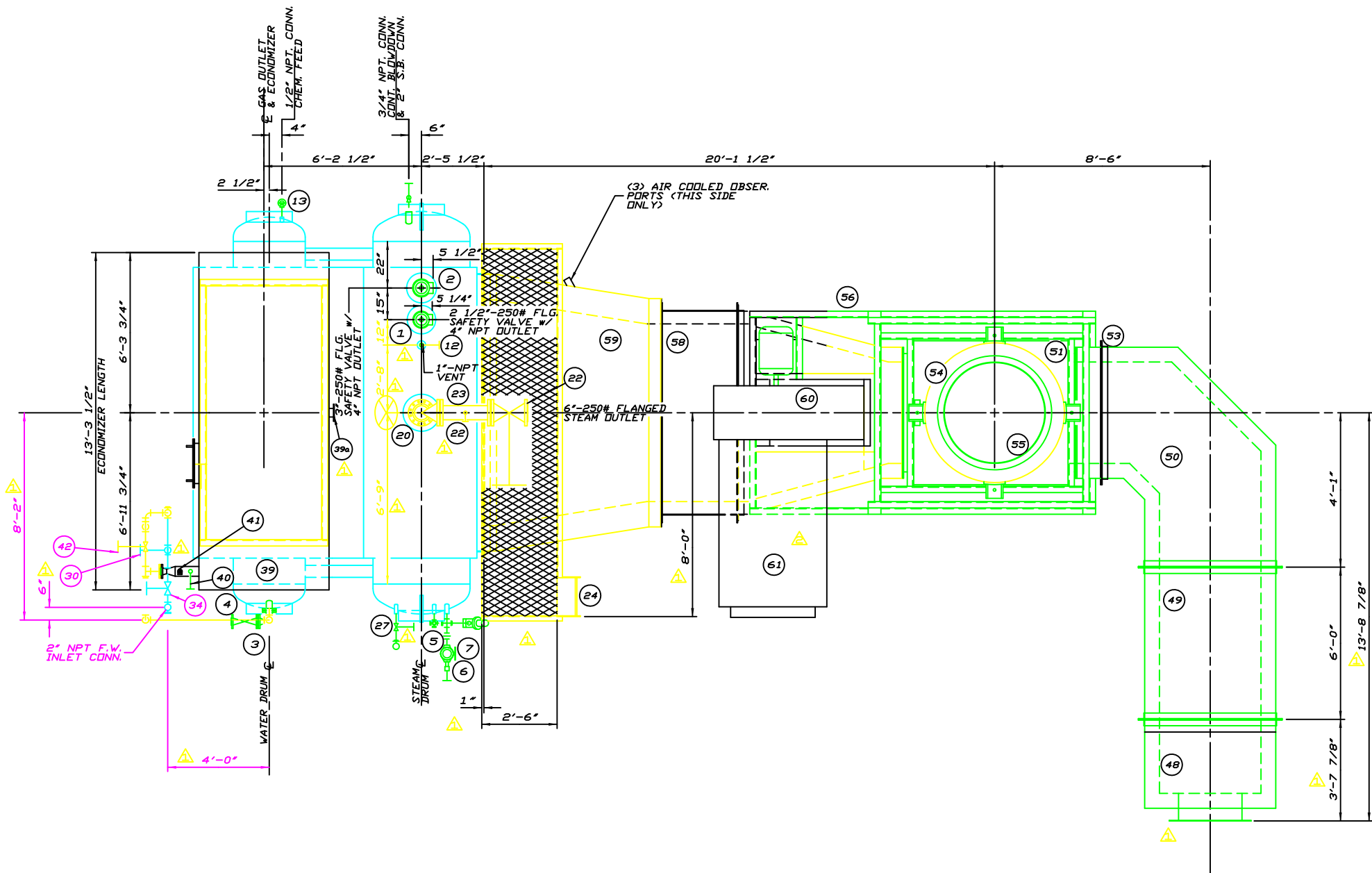
ERI-D92
X = 33.25
Y = 21.25

GENERAL ARRANGEMENT
SERIES: S3-2616 w/ECON

TRENTON STATE COLLEGE
EWING TOWNSHIP, NJ

SCALE 3/8" = 1'-0" DATE MAR. 2, 93
DRAWN BY BRAD J CHECKED PLA APPROVED
JOB NO. TJM-2137_38 W-3034, E-3035
PTY ONE (1) UNIT REQ'D DRAWING NO. 93D1600
AS SHOWN SIT. 1 OF 2

REV.	DATE	DESCRIPTION	DWN	CKD	APP
5/14/93		REV. FAN ROTATION			N.M.
4-21-93		REVISED PER CUST. REQUEST			BDH



PLAN VIEW

DESIGN DATA

1. CONTINUOUS CAPACITY	42,500 LBS/HR
2. DESIGN PRESSURE	150 PSIG
3. OPERATING PRESSURE	100 PSIG
4. FEEDWATER TEMPERATURE	220°F
5. TOTAL BOILER HEATING SURFACE	18,315 SQ.FT.
6. BOILER DRY WEIGHT	72,220 LBS
7. BOILER OPERATING WEIGHT	87,850 LBS
8. ECONOMIZER OPERATING WEIGHT	11,153 LBS
9. TOTAL OPERATING WEIGHT (BOILER, ECON.)	99,003 LBS

- NOTES:
- REFER TO ERI TB/M-2137/38 FOR A DESCRIPTION OF COMPONENTS
 - FEEDWATER PIPING TO BE SUPPORTED IN FIELD BY OTHERS.
 - PAINT: SURFACE PREP: SSPC-SP6 SHERWIN WILLIAMS KEM KROMIK B50N2 BROWN PRIMER, FINISH COAT: 854 INDUSTRIAL ENAMEL (NBC GREEN). STACK & TRANSITION TO BE PAINTED NO. 850 SERIES SILVER. PREP: SSPC-SP6.
 - EXPOSED DRUMS & DOWNCOMERS TO BE INSULATED IN SHOP BY ERI.
 - AIR COOLED OBS. PORTS USE SCANNER BLOWER AIR ONLY. TUBING BY OTHERS.

ERI-D92
 X = 33.25
 Y = 21.25

GENERAL ARRANGEMENT
 SERIES: S3-2616 w/ECON

TRENTON STATE COLLEGE
 EWING TOWNSHIP, NJ

REV.	DATE	DESCRIPTION	DWN	CKD	APP
1	5/14/93	REV. FAN ROTATION			N.M.
2	4-21-93	REVISED PER CUST. REQUEST			BDH JDD

SCALE	3/8" = 1'-0"	DATE	MAR 2, 93
DRAWN BY	BRAD J	CHECKED	PLA
APPROVED			
JOB NO.	TJM-2137, 38	W-3034, E-3035	
DRAWING NO.	93D1600		
QTY. ONE (1) UNIT REQ'D	AS SHOWN		
SHT. 2 OF 2			

APPENDIX D

Volumetric Composition of the Turbine Exhaust Gas for the Existing Solar Turbines T60-7300

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 1

kW= 5935, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 0.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0006 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

3228.	lbm/hr	FUEL FLOW
1180.75	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
41368.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
107789.	Acfm	ACTUAL EXHAUST FLOW CFm
186984.	lbm/hr	EXHAUST GAS FLOW
28.59	---	MOLECULAR WEIGHT OF EXHAUST GAS
57.02	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.91	3.03	5.87	75.76	14.44	VOLUME PERCENT WET
0.96	3.22	0.00	80.48	15.34	VOLUME PERCENT DRY
2366.	8714.	6912.	138777.	30211.	lbm/hr
0.73	2.70	2.14	42.99	9.36	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 1

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5935, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 0.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
29.24	35.60	10.19	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.08	1.31	0.38	lbm/(MW-hr) (gas turbine shaft pwr)
6.67	8.13	2.33	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 2

kW= 5584, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 20.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0014 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

3083.	lbm/hr	FUEL FLOW
1127.85	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
40660.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
107559.	Acfm	ACTUAL EXHAUST FLOW CFm
183764.	lbm/hr	EXHAUST GAS FLOW
28.59	---	MOLECULAR WEIGHT OF EXHAUST GAS
58.69	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.91	2.94	5.83	75.72	14.60	VOLUME PERCENT WET
0.96	3.12	0.00	80.41	15.50	VOLUME PERCENT DRY
2324.	8320.	6749.	136341.	30026.	lbm/hr
0.75	2.70	2.19	44.22	9.74	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 2

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5584, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 20.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
27.90	33.97	9.73	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.09	1.33	0.38	lbm/(MW-hr)
			(gas turbine shaft pwr)
6.37	7.76	2.22	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 3

kW= 5220, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 40.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0032 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2955.	lbm/hr	FUEL FLOW
1080.91	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
39583.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
104973.	Acfm	ACTUAL EXHAUST FLOW CFm
178744.	lbm/hr	EXHAUST GAS FLOW
28.57	---	MOLECULAR WEIGHT OF EXHAUST GAS
59.58	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.90	2.89	6.01	75.55	14.65	VOLUME PERCENT WET
0.96	3.08	0.00	80.37	15.59	VOLUME PERCENT DRY
2258.	7961.	6770.	132419.	29333.	lbm/hr
0.76	2.69	2.29	44.81	9.93	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 3

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5220, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 40.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
26.69	32.49	9.31	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.12	1.36	0.39	lbm/(MW-hr)
			(gas turbine shaft pwr)
6.09	7.42	2.12	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 4

kW= 4826, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 60.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0067 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2790.	lbm/hr	FUEL FLOW
1020.62	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
38187.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
101571.	Acfm	ACTUAL EXHAUST FLOW CFm
172136.	lbm/hr	EXHAUST GAS FLOW
28.52	---	MOLECULAR WEIGHT OF EXHAUST GAS
60.79	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.90	2.82	6.41	75.18	14.69	VOLUME PERCENT WET
0.96	3.01	0.00	80.33	15.70	VOLUME PERCENT DRY
2167.	7493.	6973.	127125.	28374.	lbm/hr
0.78	2.69	2.50	45.56	10.17	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 4

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4826, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 60.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
25.11	30.57	8.75	ton/yr
0.100	0.121	0.035	lbm/MMBtu (Fuel LHV)
1.14	1.38	0.40	lbm/(MW-hr)
			(gas turbine shaft pwr)
5.73	6.98	2.00	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 5

kW= 4432, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 80.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0134 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	=	92.7899
Ethane (C2H6)	=	4.1600
Propane (C3H8)	=	0.8400
N-Butane (C4H10)	=	0.1800
N-Pentane (C5H12)	=	0.0400
Hexane (C6H14)	=	0.0400
Carbon Dioxide (CO2)	=	0.4400
Hydrogen Sulfide (H2S)	=	0.0001
Nitrogen (N2)	=	1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2633.	lbm/hr	FUEL FLOW
962.93	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
36508.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
97994.	Acfm	ACTUAL EXHAUST FLOW CFm
163966.	lbm/hr	EXHAUST GAS FLOW
28.41	---	MOLECULAR WEIGHT OF EXHAUST GAS
61.38	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.89	2.77	7.32	74.43	14.60	VOLUME PERCENT WET
0.96	2.98	0.00	80.30	15.75	VOLUME PERCENT DRY
2051.	7024.	7609.	120325.	26953.	lbm/hr
0.78	2.67	2.89	45.71	10.24	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 5

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4432, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 80.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
23.53	28.65	8.21	ton/yr
0.099	0.121	0.035	lbm/MMBtu (Fuel LHV)
1.16	1.41	0.40	lbm/(MW-hr)
			(gas turbine shaft pwr)
5.37	6.54	1.87	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 6

kW= 4004, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature=100.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0255 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2476.	lbm/hr	FUEL FLOW
905.59	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
34675.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
94139.	Acfm	ACTUAL EXHAUST FLOW CFm
154699.	lbm/hr	EXHAUST GAS FLOW
28.22	---	MOLECULAR WEIGHT OF EXHAUST GAS
61.58	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.87	2.71	8.99	73.08	14.35	VOLUME PERCENT WET
0.96	2.97	0.00	80.30	15.77	VOLUME PERCENT DRY
1913.	6529.	8878.	112210.	25166.	lbm/hr
0.77	2.64	3.59	45.32	10.16	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 6

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4004, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature=100.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
21.87	26.63	7.63	ton/yr
0.098	0.119	0.034	lbm/MMBtu (Fuel LHV)
1.19	1.45	0.42	lbm/(MW-hr)
			(gas turbine shaft pwr)
4.99	6.08	1.74	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
 ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
 CUSTOMER: TCNJ
 JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
 RUN BY: Brian C Spencer

TAURUS 60-7300S
 GSC
 STANDARD
 DUAL
 TTD-1S REV. 0.2

DATA FOR MINIMUM PERFORMANCE

*** REFERENCE PIB 156 FOR PURGE REQUIREMENTS ***
 ** PIB 127 HARSH ENVIRONMENT REQUIREMENTS APPLY; SEE GFS OUTPUT FOR FURTHER DETAILS. **
 *** FOLLOW LFS OUTPUT RESULTS FOR SER REQUIREMENTS.
 SoLoNOx DIESEL FUEL SULFUR LIMITS APPLY PER PIB 296. ***

Fuel Type	SD NATURAL GAS						
Elevation	feet	140					
Inlet Loss	in H2O	4.0					
Exhaust Loss	in H2O	10.0					
Engine Inlet Temp.	deg F	0	20.0	40.0	60.0	80.0	100.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0	60.0
Elevation Loss	kW	31	29	27	25	23	21
Inlet Loss	kW	97	92	88	82	77	71
Exhaust Loss	kW	94	92	89	86	83	78
Gearbox Efficiency		0.9820	0.9820	0.9820	0.9820	0.9820	0.9820
Generator Efficiency		0.9740	0.9740	0.9740	0.9740	0.9740	0.9740
Based On 1.0 Power Factor							
Specified Load*	kW	FULL	FULL	FULL	FULL	FULL	FULL
Net Output Power*	kW	5935	5584	5220	4826	4432	4004
Fuel Flow	mmBtu/hr	66.54	63.56	60.91	57.51	54.26	51.03
Heat Rate*	Btu/kW-hr	11211	11382	11668	11918	12244	12745
Therm Eff*	%	30.437	29.977	29.243	28.629	27.867	26.772
Inlet Air Flow	lbm/hr	184051	180970	176070	169617	161592	152467
Engine Exhaust Flow	lbm/hr	186984	183764	178744	172136	163966	154699
PCD	psiG	176.4	172.9	166.6	159.4	152.5	144.1
Compensated PTIT	deg F	1250	1250	1250	1250	1250	1250
PT Exit Temperature	deg F	888	908	912	916	928	944
Exhaust Temperature	deg F	888	908	912	916	928	944

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4) = 92.7899
 Ethane (C2H6) = 4.1600
 Propane (C3H8) = 0.8400
 N-Butane (C4H10) = 0.1800
 N-Pentane (C5H12) = 0.0400
 Hexane (C6H14) = 0.0400
 Carbon Dioxide (CO2) = 0.4400
 Hydrogen Sulfide (H2S) = 0.0001

ESTIMATES ONLY, NOT GUARANTEED

Nitrogen (N2) = 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

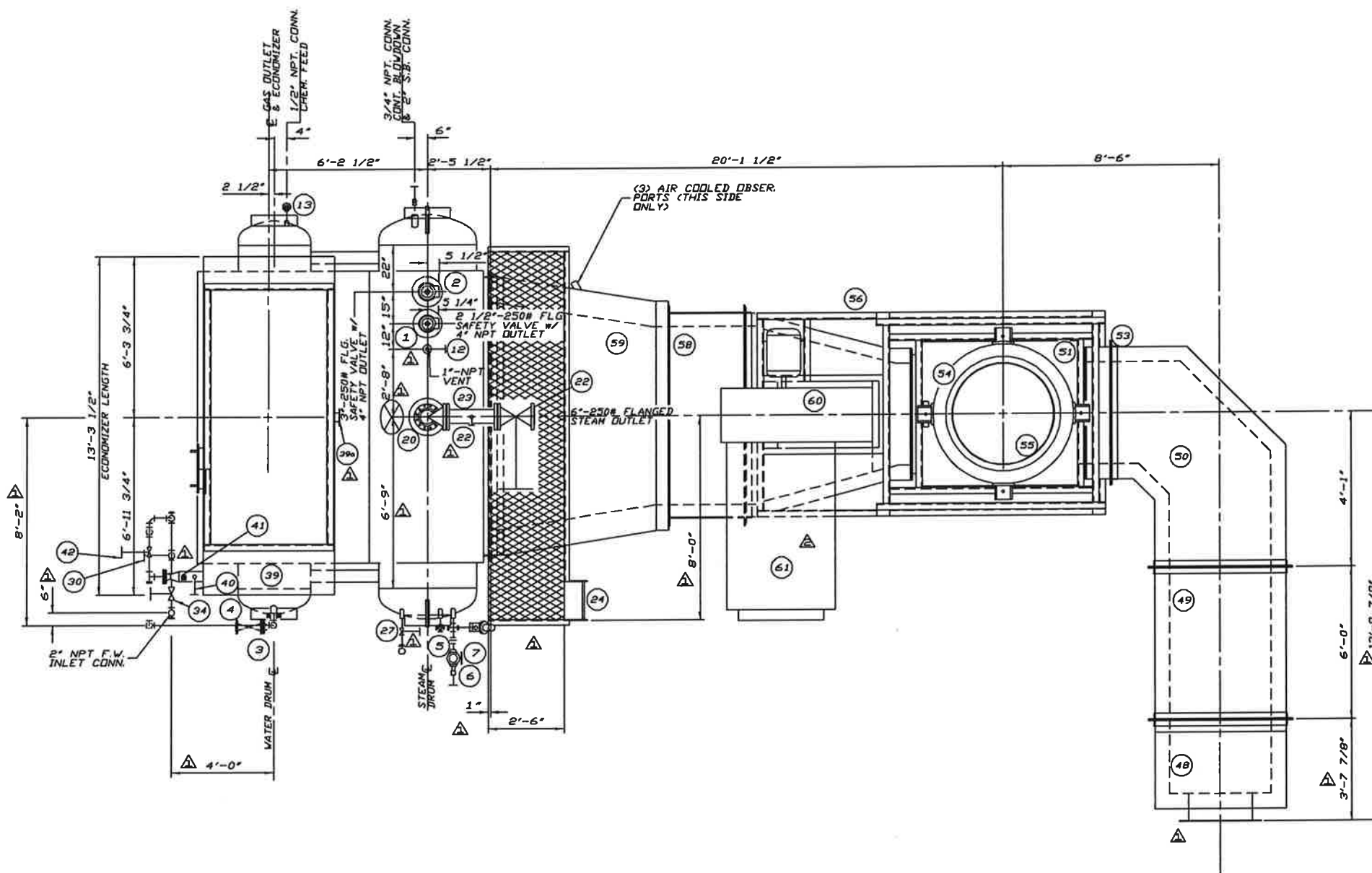
*Electric power measured at the generator terminals.
This performance was calculated with a basic inlet and exhaust system.
Special equipment such as low noise silencers, special filters, heat recovery systems or cooling devices will affect engine performance.
Performance shown is "Expected" performance at the pressure drops stated, not guaranteed.

NOTES

Estimates Only, NOT GUARANTEED

APPENDIX E

Energy Recovery International (ERI) drawings for Heat Recovery Steam Generator (HRSG)



PLAN VIEW

DESIGN DATA

1. CONTINUOUS CAPACITY	42,500 LBS/HR
2. DESIGN PRESSURE	150 PSIG
3. OPERATING PRESSURE	100 PSIG
4. FEEDWATER TEMPERATURE	220°F
5. TOTAL BOILER HEATING SURFACE	18,315 SQ.FT.
6. BOILER DRY WEIGHT	72,220 LBS
7. BOILER OPERATING WEIGHT	87,850 LBS
8. ECONOMIZER OPERATING WEIGHT	11,153 LBS
9. TOTAL OPERATING WEIGHT (BOILER, ECON.)	99,003 LBS

- NOTES:
- REFER TO ERI TB/M-2137/38 FOR A DESCRIPTION OF COMPONENTS
 - FEEDWATER PIPING TO BE SUPPORTED IN FIELD BY OTHERS.
 - PAINT: SURFACE PREP: SSPC-SP6 SHERWIN WILLIAMS KEM KROMIK B50N6 BROWN PRIMER, FINISH COAT: B54 INDUSTRIAL ENAMEL (NRC GREEN); STACK & TRANSITION TO BE PAINTED NO. 850 SERIES SILVER. PREP: SSPC-SP6.
 - EXPOSED DRUMS & DOWNCOMERS TO BE INSULATED IN SHOP BY ERI.
 - AIR COOLED OBS. PORTS USE SCANNER BLOWER AIR ONLY. TUBING BY OTHERS.

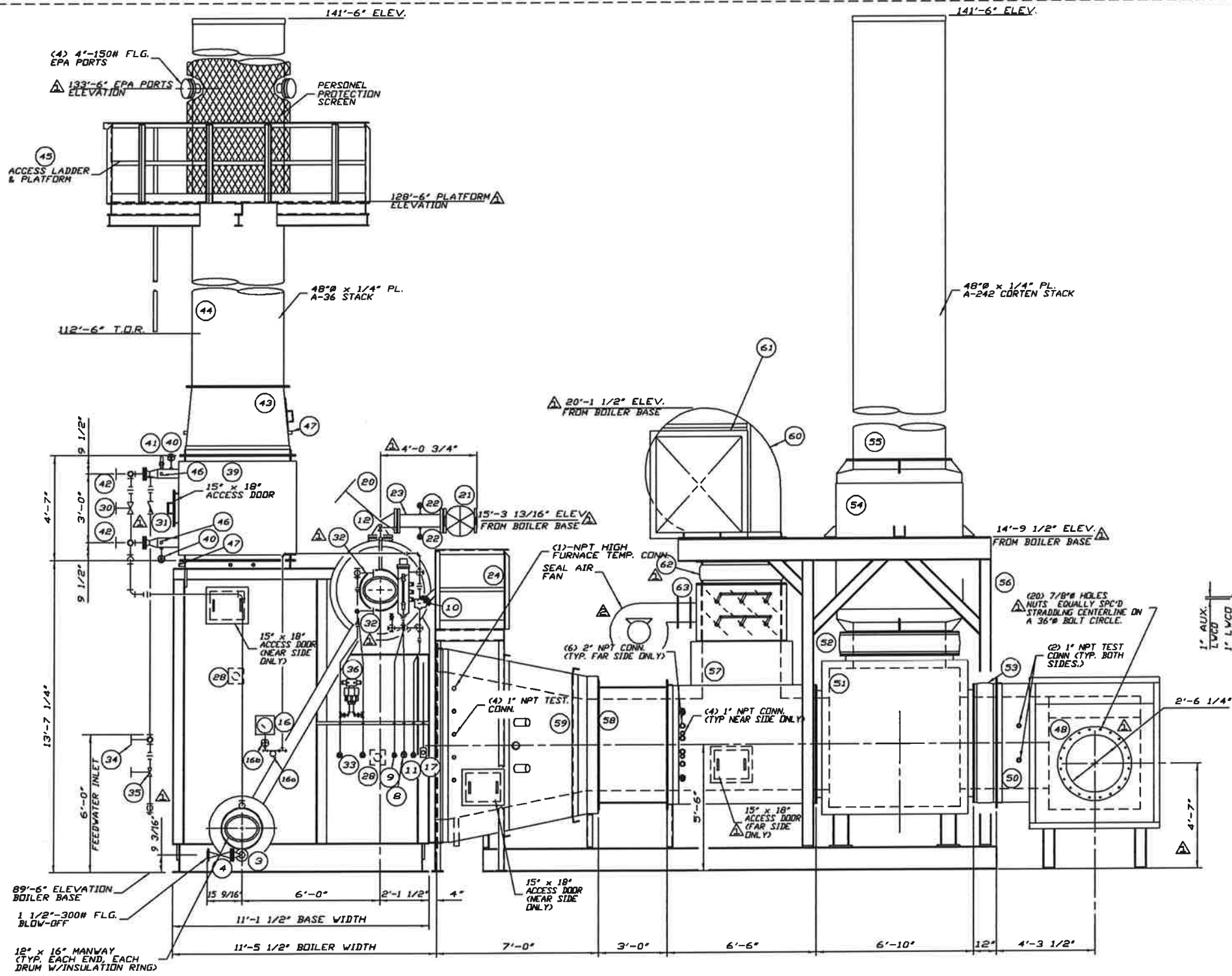
ERI-D92
 X = 33.25
 Y = 21.25

GENERAL ARRANGEMENT
 SERIES: S3-2616 w/ECON

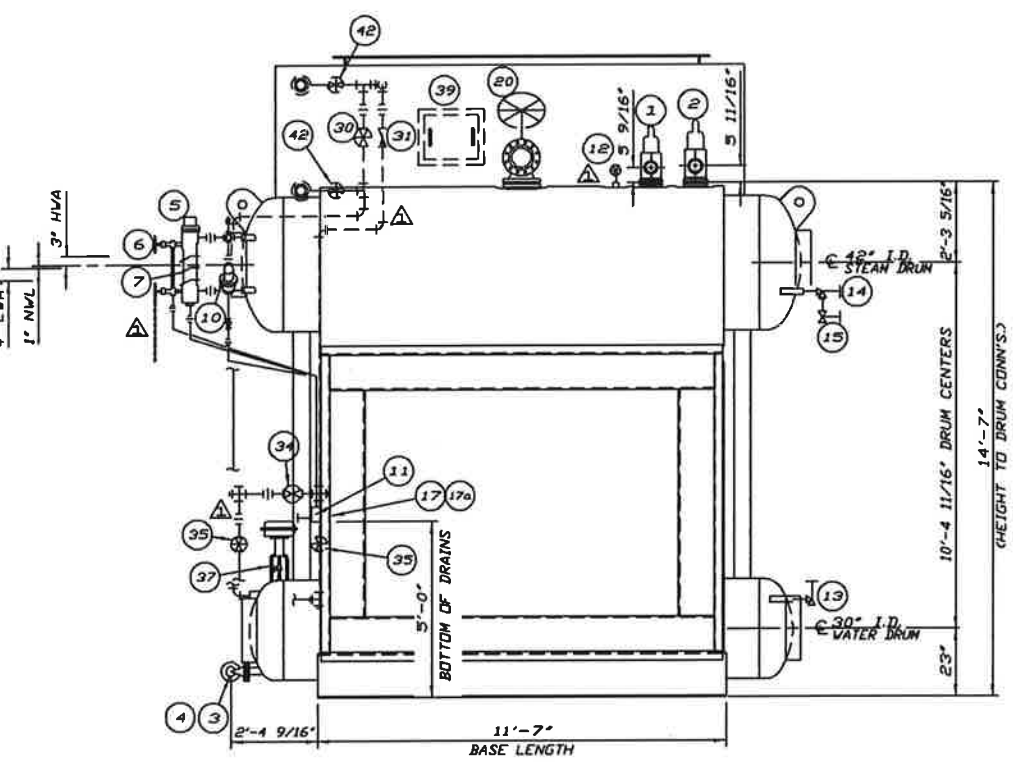
TRENTON STATE COLLEGE
 EWING TOWNSHIP, NJ

REV.	DATE	DESCRIPTION	BY	CHKD	APP
1	5/14/93	REV. FAN ROTATION	N.M.		
2	1-21-93	REVISED PER CUST. REQUEST	BDH	JDD	

SCALE	3/8" = 1'-0"	DATE	MAR. 2, 93
DRAWN BY	BRAD J	CHECKED	PLA
JOB NO.	TJM-2137, 38	W-3034, E-3035	
QTY.	DNE (1) UNIT REQ'D AS SHOWN	DRAWING NO.	93D1600
		DATE	MAR. 2, 93



FRONT VIEW



SIDE VIEW
BOILER & ECONOMIZER ONLY

ERI-D92
X = 33.25
Y = 21.25

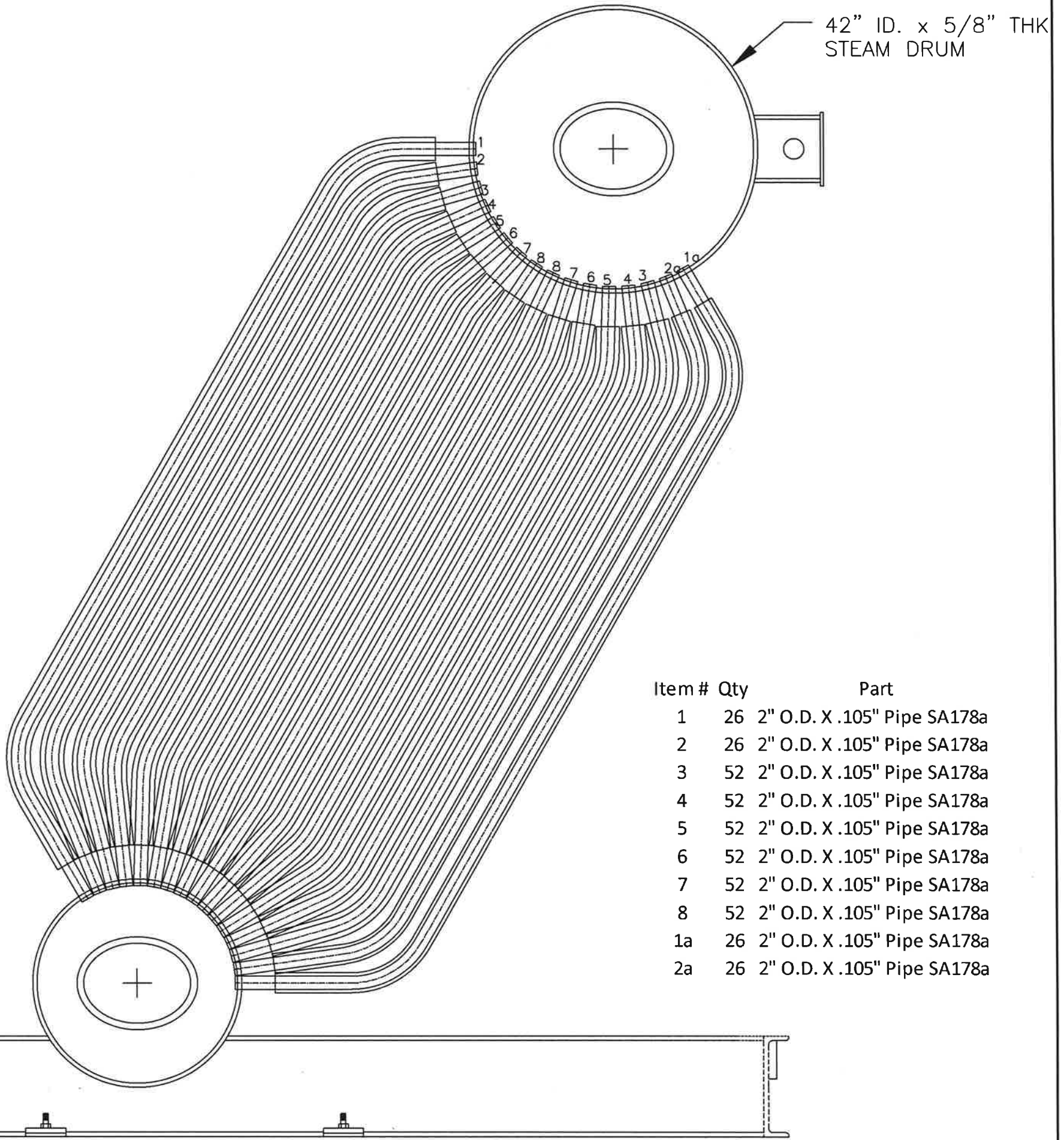
GENERAL ARRANGEMENT
SERIES: S3-2616 w/ECON

TRENTON STATE COLLEGE
EWING TOWNSHIP, NJ

SCALE	3/8" = 1'-0"	DATE	MAR. 2, 93
DRAWN BY	BRAD J	CHECKED/PLA	APPROVES
JOB NO.	TJM-2137, 38	W-3034, E-3035	
QTY	ONE (1) UNIT REQ'D	DRAWING NO.	93D1600
	AS SHOWN	SHT. 1 OF 2	1

REV.	DATE	DESCRIPTION	DWN	CHKD	APP
5/14/93		REV. FAN ROTATION			N.M.
4-21-93		REVISED PER CUST. REQUEST			BDH

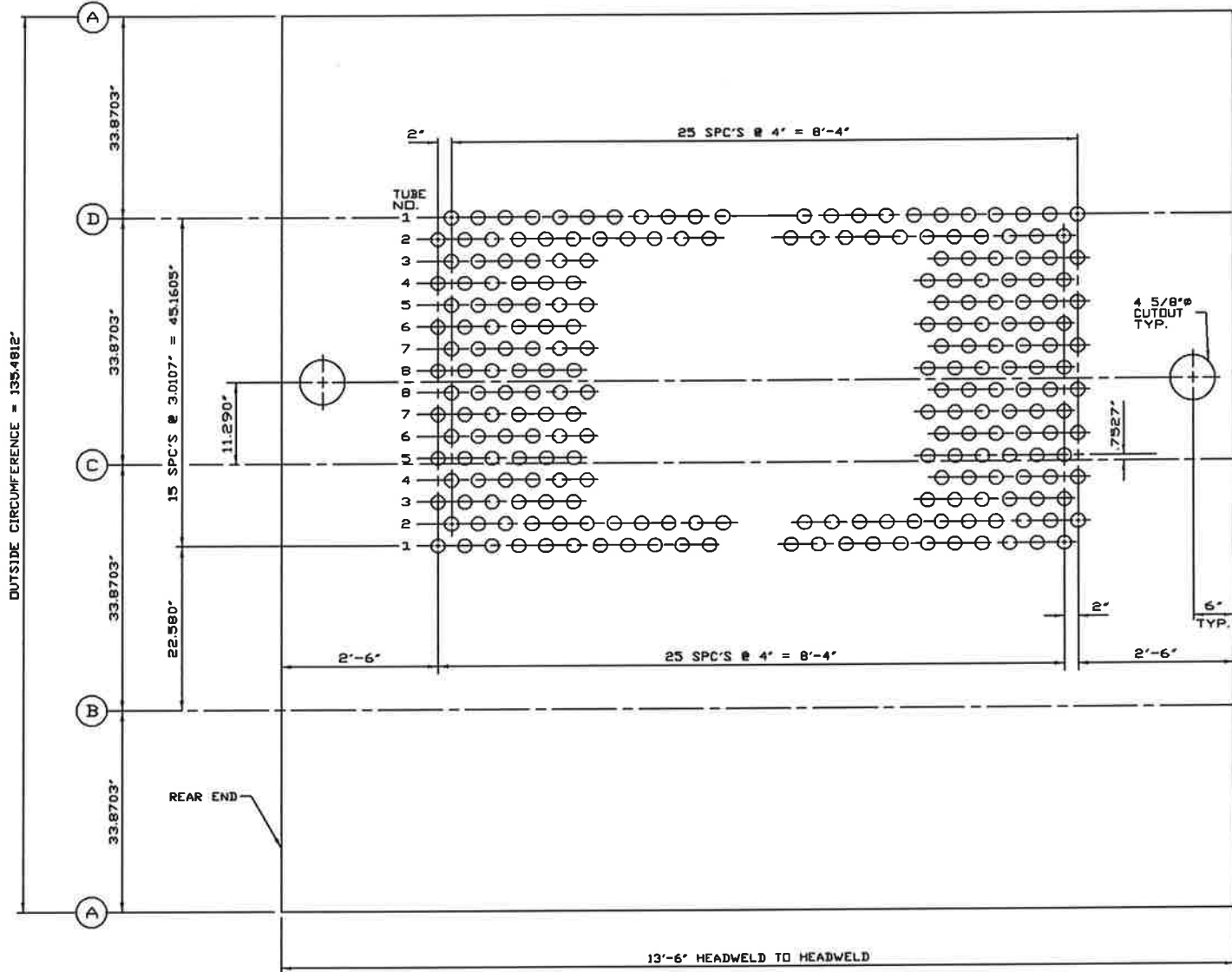
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0		INITIAL RELEASE OF DRAWING		CRR				



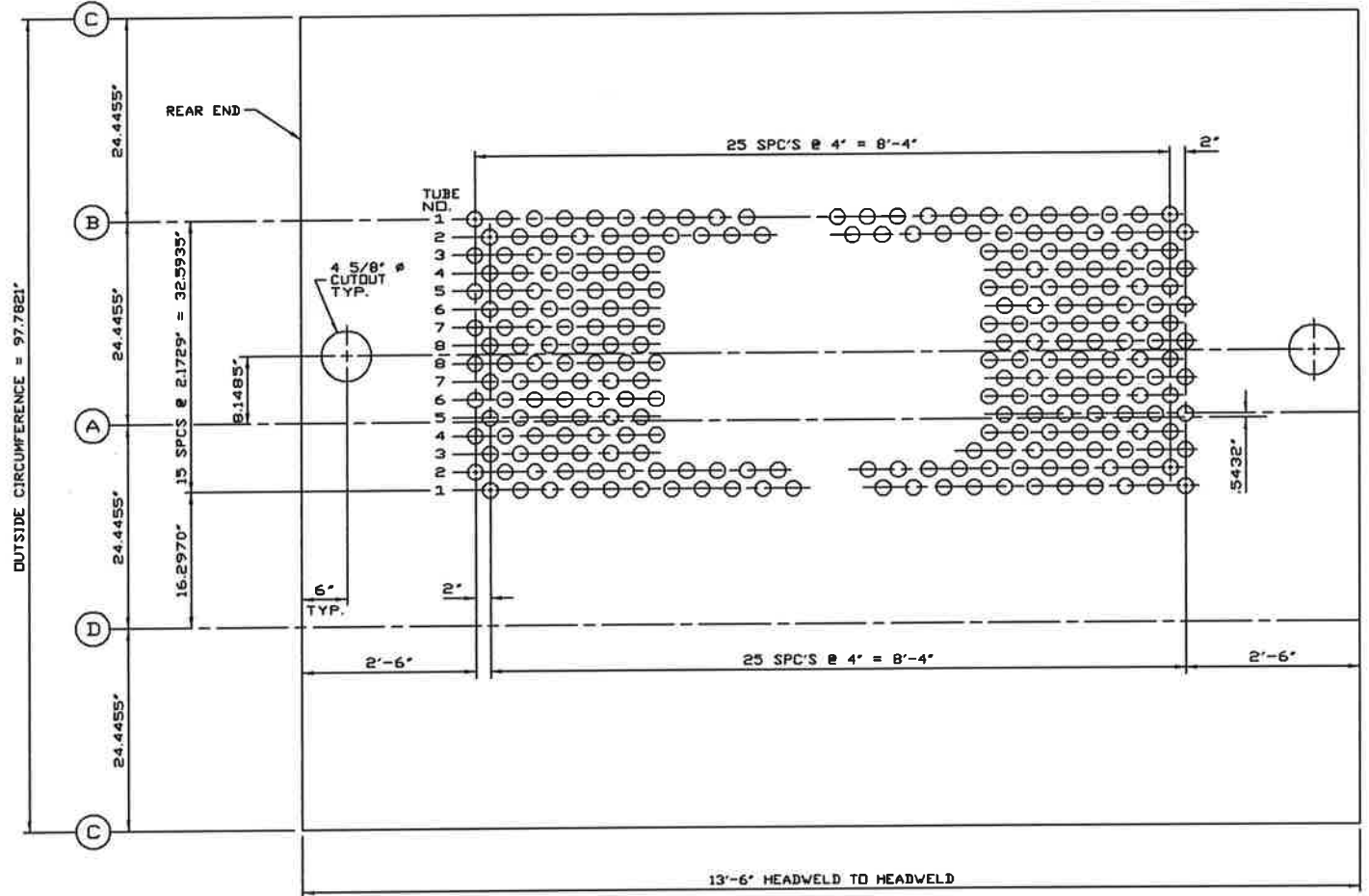
Item #	Qty	Part
1	26	2" O.D. X .105" Pipe SA178a
2	26	2" O.D. X .105" Pipe SA178a
3	52	2" O.D. X .105" Pipe SA178a
4	52	2" O.D. X .105" Pipe SA178a
5	52	2" O.D. X .105" Pipe SA178a
6	52	2" O.D. X .105" Pipe SA178a
7	52	2" O.D. X .105" Pipe SA178a
8	52	2" O.D. X .105" Pipe SA178a
1a	26	2" O.D. X .105" Pipe SA178a
2a	26	2" O.D. X .105" Pipe SA178a

TUBE DATA
2" O.D. x .105" MIN. WALL x SA-178-A

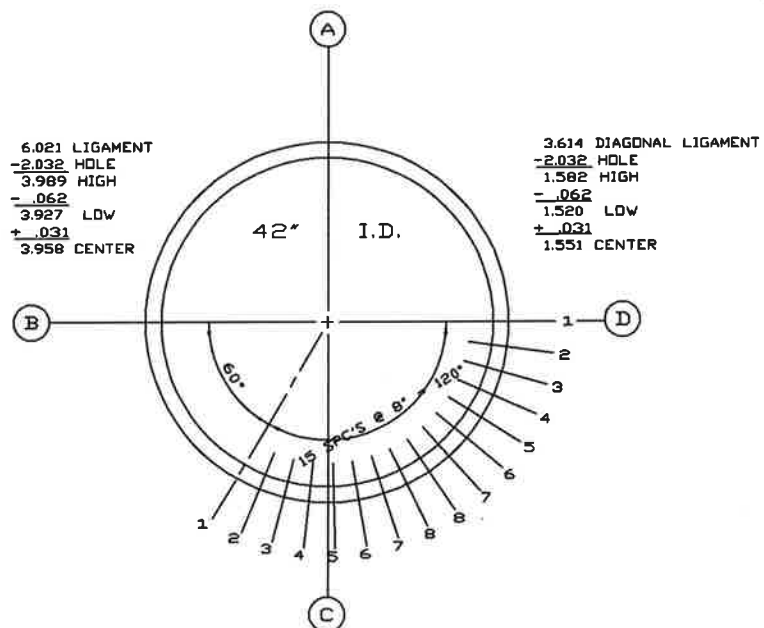
CleaverBrooks® ENGINEERED BOILER SYSTEMS	
NEBRASKA BOILER, CLEAVER-BROOKS, AND ENERGY RECOVERY INTERNATIONAL WITH NATCOM BURNER SYSTEMS	
TUBE BENDING, SPIRAL WOUND SERIES:S3	
SCALE: NONE	
JOB NO.:	SERIAL NO.:
HAND:	DRAWING NO. SHEET 1 OF 1
	0 REV



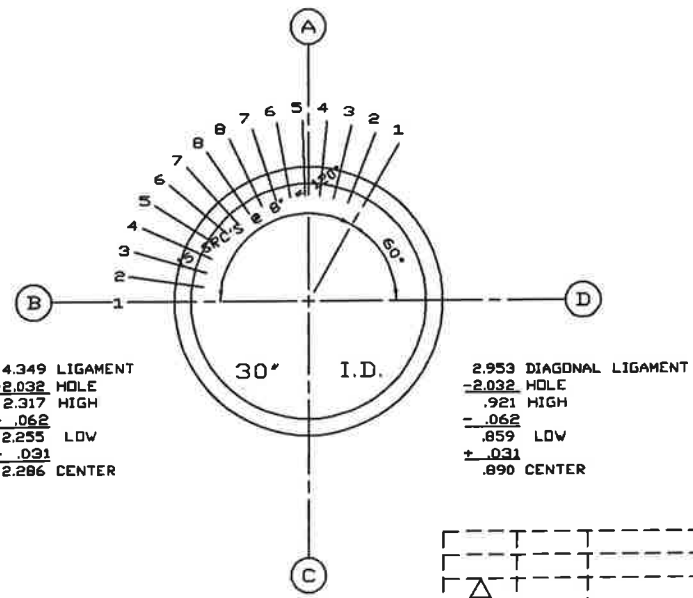
DEVELOPED OUTSIDE SURFACE
STEAM DRUM



DEVELOPED OUTSIDE SURFACE
WATER DRUM



STEAM DRUM SECTION
AS VIEWED FROM REAR END



WATER DRUM SECTION
AS VIEWED FROM REAR END

- NOTES:
1. DRILL HOLES IN STEAM DRUM 2.0432 MAX
DRILL HOLES IN WATER DRUM 2.0432 MAX
 2. DEBURR ALL HOLES INSIDE & OUTSIDE
 3. TUBE HOLE LIGAMENT EFFICIENCY
48.95% EQUIVALENT LONGITUDINAL - STM. DRUM
48.95% EQUIVALENT LONGITUDINAL - WATER DRUM
 4. SERRATE ALL TUBE HOLES PER S-3-329.

ERI-D92
X = 33.25
Y = 21.25

DRUM DRILLING
SERIES: S3-2616

TRENTON STATE COLLEGE
EWING TOWNSHIP, N.J.

SCALE: NONE	DATE: 4-16-93
DRAWN: BBDH	CHECKED: APPROVED:
JOB NO: JM-2137	V-3034
QTY: ONE (1) UNIT REQ.	DRAWING NO: 93D1603

REV.	DATE	DESCRIPTION	BY	CHKD	APP



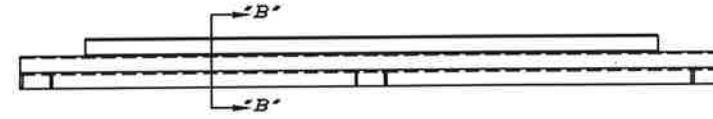
ITEM DETAIL #6



ITEM DETAIL #1



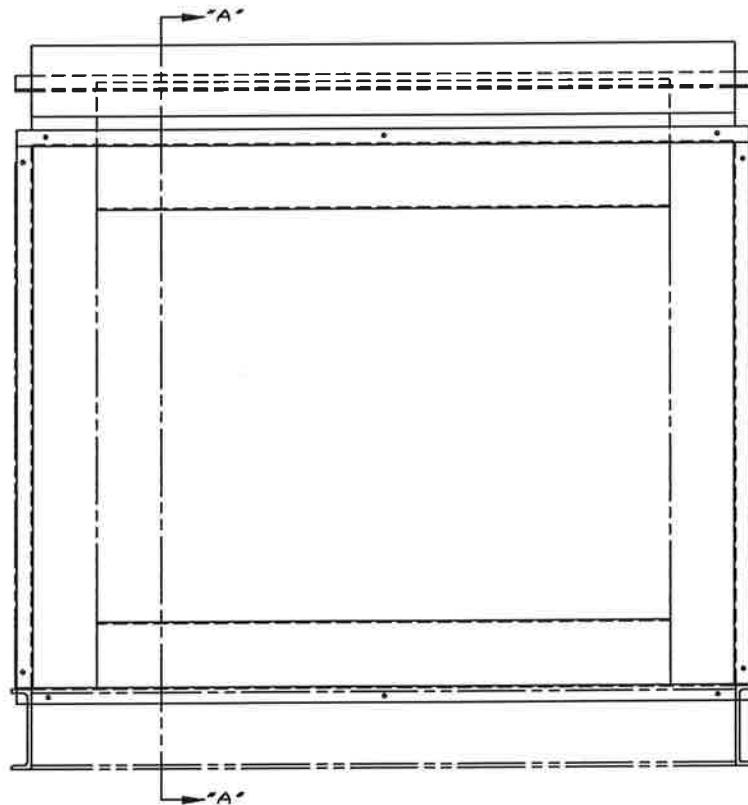
SECTION 'B'-'B'



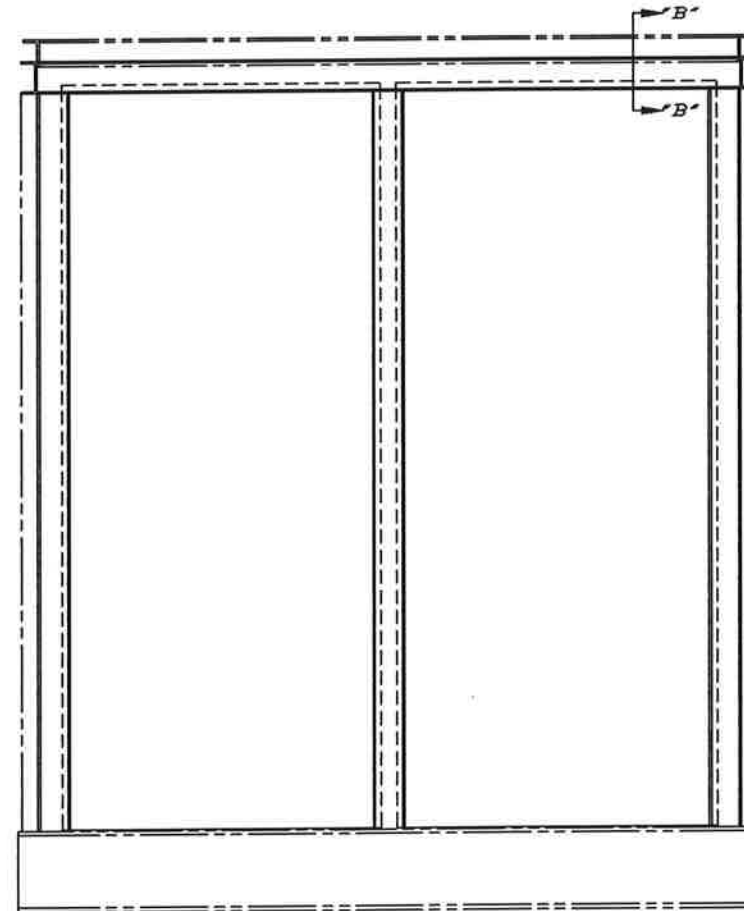
PLAN VIEW



SECTION 'A'-'A'



RIGHT SIDE VIEW



LEFT SIDE VIEW

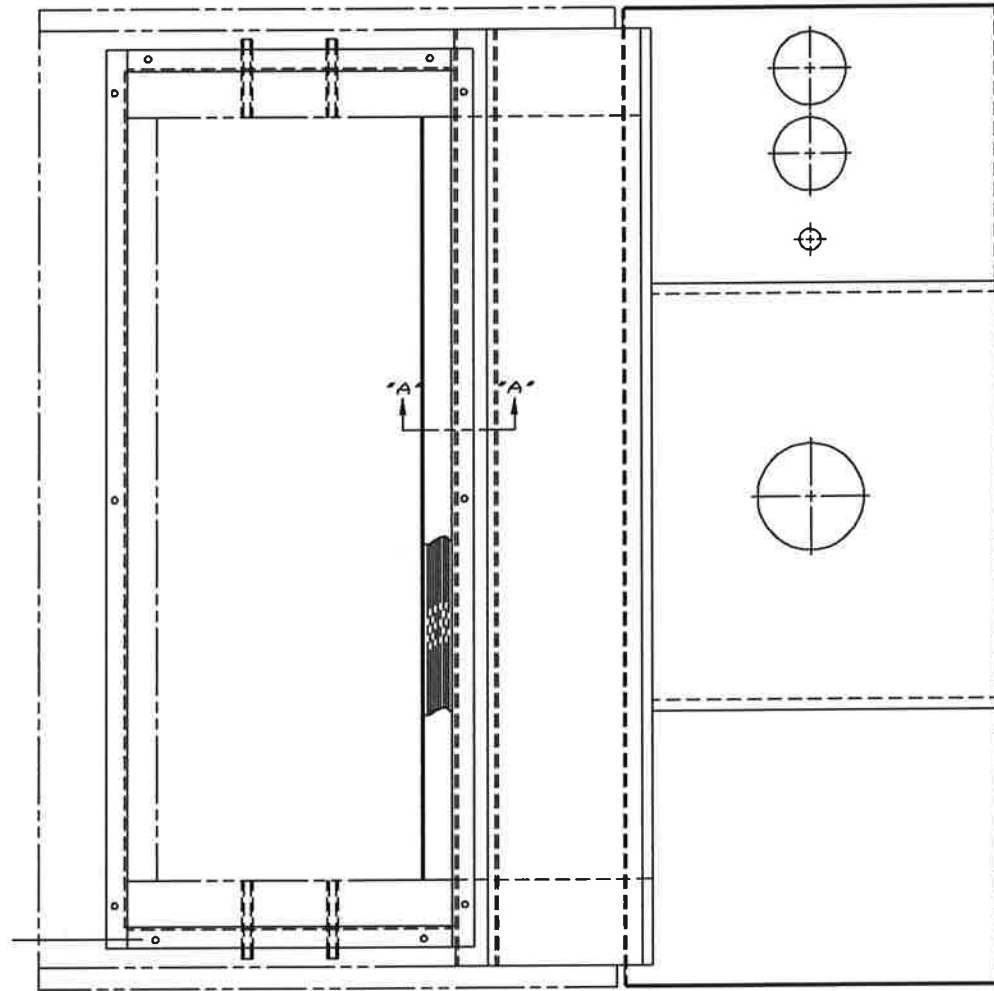
REV.	DATE	DESCRIPTION	DWN	CHKD	APP
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△					
△					
△					

ERI-D92
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 Y = 21.25

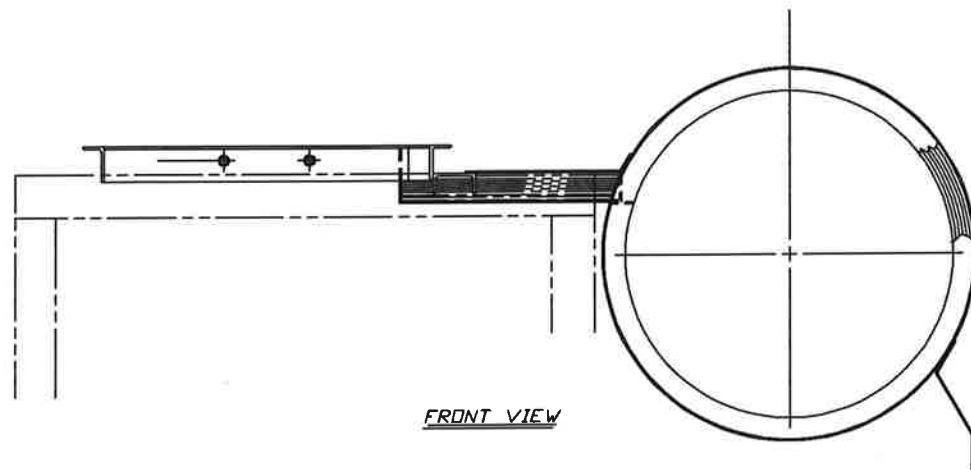
SIDE WALL CONSTRUCTION
 SERIES: S3-2616

TRENTON STATE COLLEGE
 EWING TOWNSHIP, N.J.

SCALE: NONE DATE: 4-16-93
 DRAWN BY: BDH CHECKED BY: APPROVED
 JOB NO: M-2137 V-3034
 QTY: ONE (1) UNIT REQD DRAWING NO.
 AS SHOWN



PLAN VIEW



FRONT VIEW



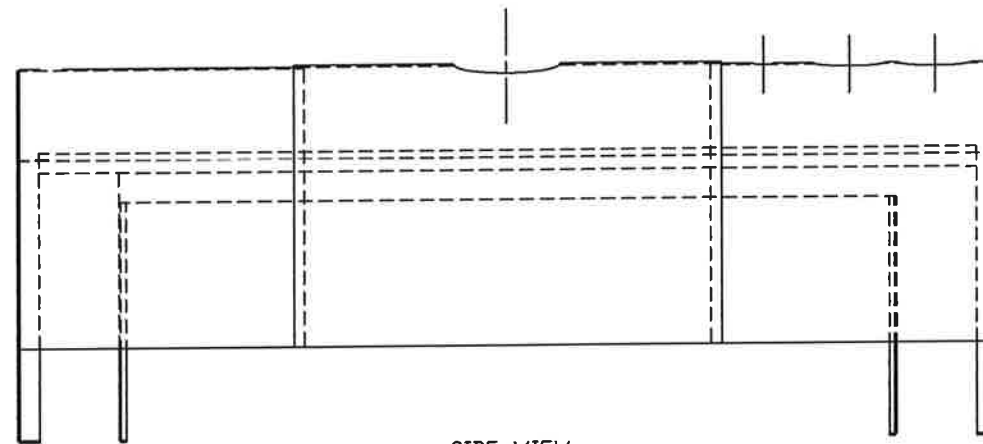
DETAIL ITEM # 6



DETAIL ITEM # 4



SECTION "A" - "A"



SIDE VIEW

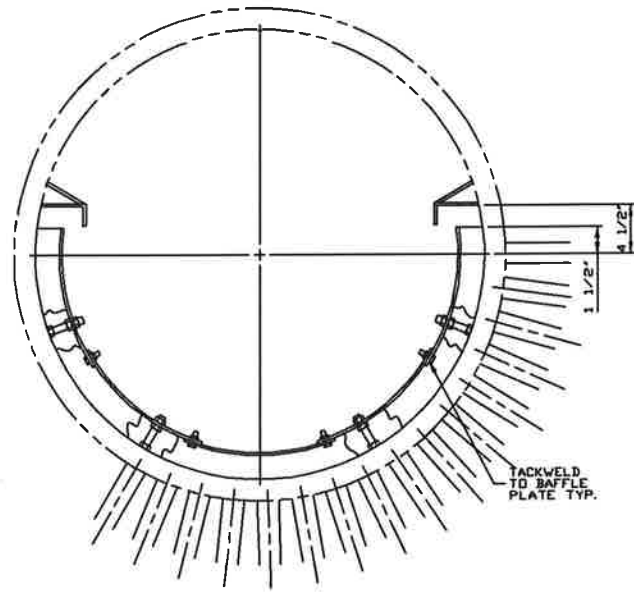
ERI-D92
X = 33.25
Y = 21.25

ROOF CASING CONSTRUCTION
SERIES: S3-2616

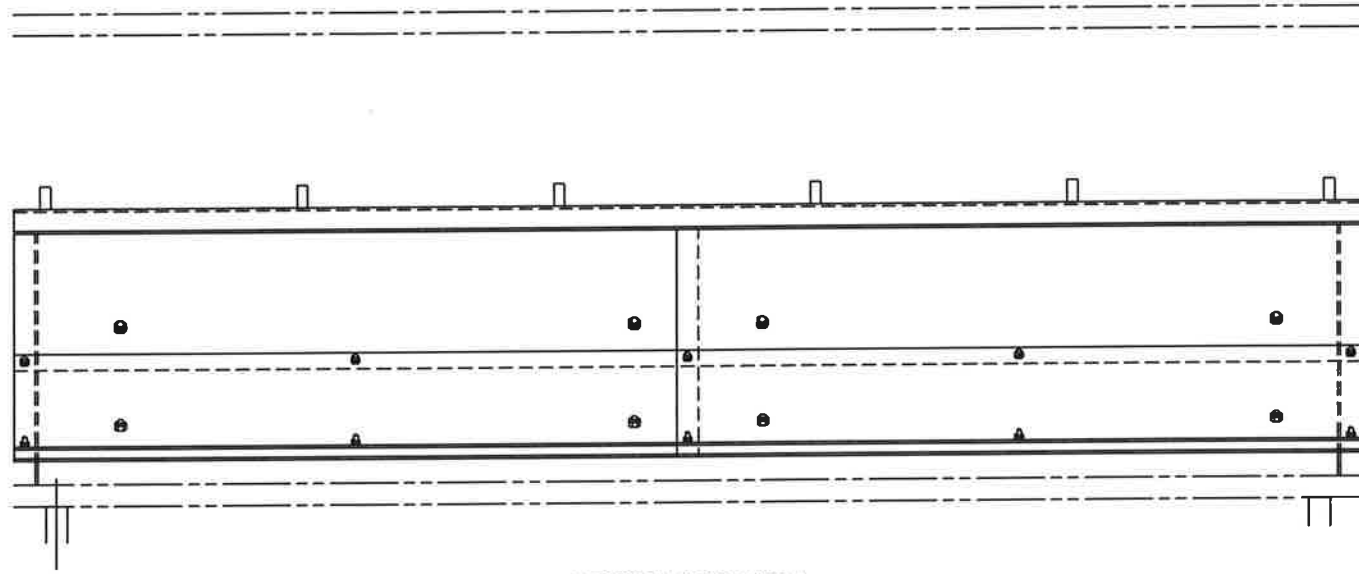
TRENTON STATE COLLEGE
EWING TOWNSHIP, N.J.

REV.	DATE	DESCRIPTION	DWN	CHKD	APP
△					
△					
△					

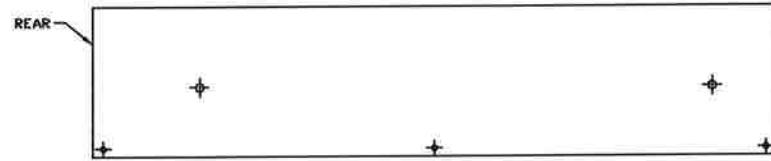
SCALE: NONE DATE: 4-22-93
DRAWN BY: BDH CHECKED: APPROVED:
JOB NO: R-2137 V-3034
QTY: ONE (1) UNIT REQD. DRAWING NO. 0316
AS SHOWN



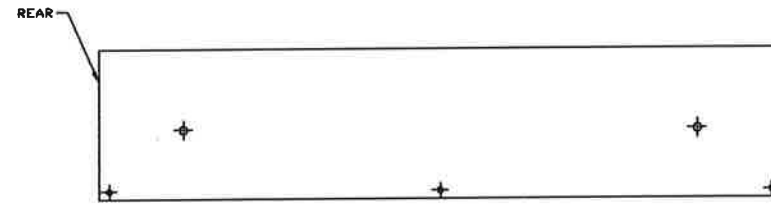
REAR END VIEW



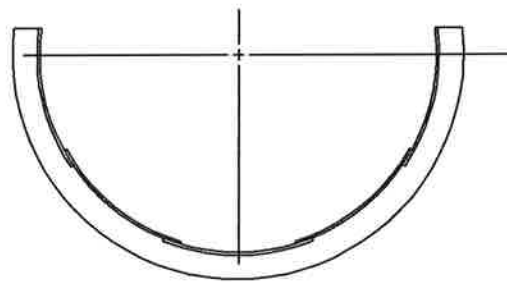
SECTION SIDE VIEW



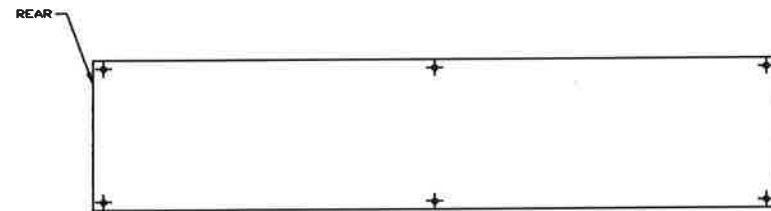
DETAIL ITEM #2
THREE (3) REQ'D



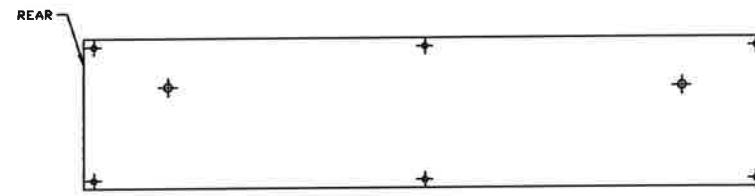
DETAIL ITEM #5
ONE (1) REQ'D



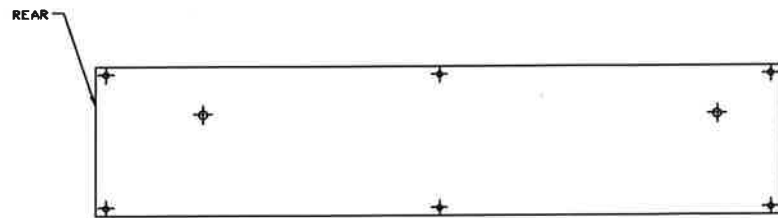
BAFFLE DETAIL



DETAIL ITEM #4
TWO (2) REQ'D



DETAIL ITEM #6
ONE (1) REQ'D



DETAIL ITEM #3
THREE (3) REQ'D

- NOTES:
1. ALL WELDING DONE DIRECTLY TO A PRESSURE PART IS TO WELDED & STAMPED BY A QUALIFIED WELDER.
 2. REMOVE ALL ARC STRIKES & TACKWELDS FROM PRESSURE PARTS

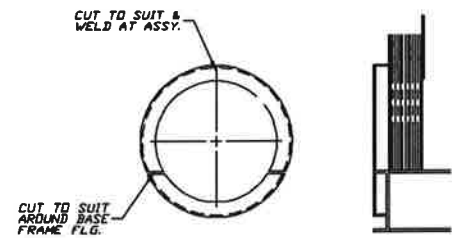
ERI-D92
X = 33.25
Y = 21.25

PRIMARY STEAM BAFFLE
SERIES: S3-2616

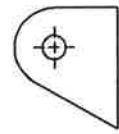
TRENTON STATE COLLEGE
EWING TOWNSHIP, N.J.

REV.	DATE	DESCRIPTION	DNW	CHKD	APP

SCALE: NONE DATE: 4-23-93
 DRAWN BY: BDH CHECKED BY: APPROVED BY: _____
 JOB NO: 14-2137 DRAWING NO: W-3034
 QTY: ONE (1) UNIT REQ'D: AS SHOWN DRAWING NO. _____



LOWER DRUM COVER SEAL



DETAIL ITEM #20



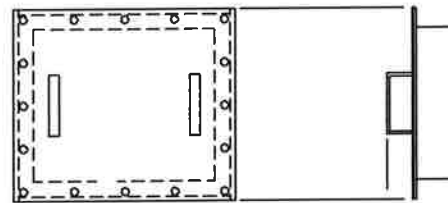
SECTION "A" - "A"



S.B. SLEEVE
INSTALLATION
TYP. (2) PLACES



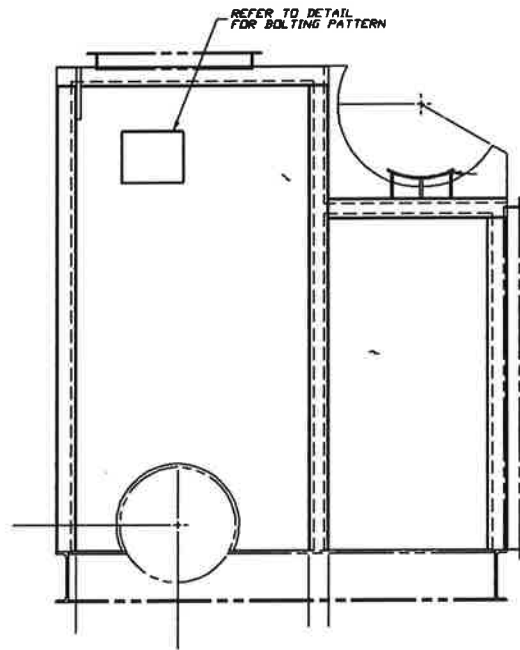
PLAN VIEW



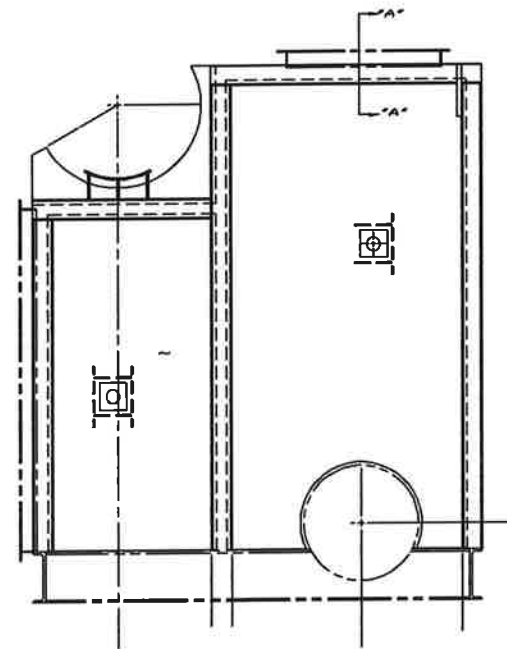
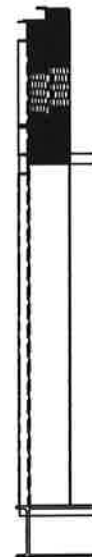
ACCESS DOOR



PLAN VIEW



FRONT END VIEW



REAR END VIEW

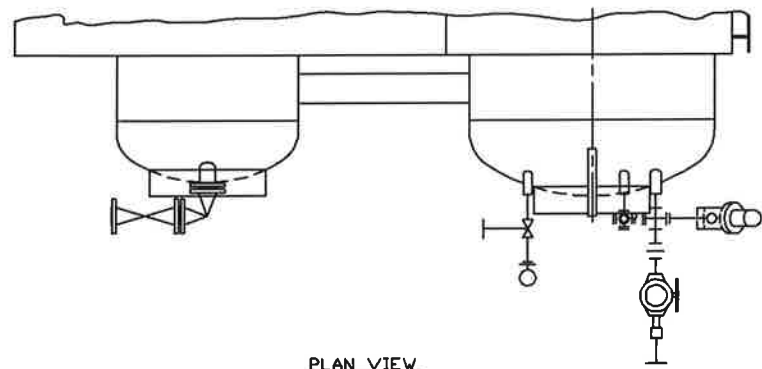
REV.	DATE	DESCRIPTION	DWN	CKD	APP
△					
△					
△	6-21-93	MOVED JIDS 20, 24 & 25 FROM FRONT END TO REAR END.	BDH		
△	6-15-93	REMOVED DISTAL BEARING	BDH	JDD	GC

ERI-D92
X = 33.25
Y = 21.25

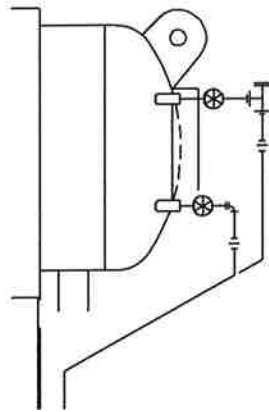
END WALL CONSTRUCTION
SERIES S3-2616

TRENTON STATE COLLEGE
EWING, TOWNSHIP, N.J.

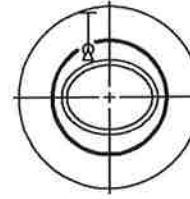
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DRAWN BY: BDH CHECKED BY: PLA APPROVED BY: GC
JOB NO: T-M-2137 U-3034
DWTY: ONE (1) UNIT REQD. DRAWING NO. 28
AS SHOWN



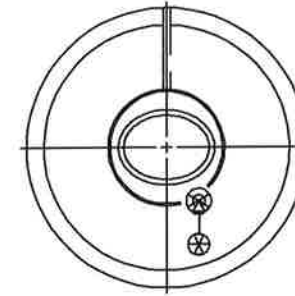
PLAN VIEW



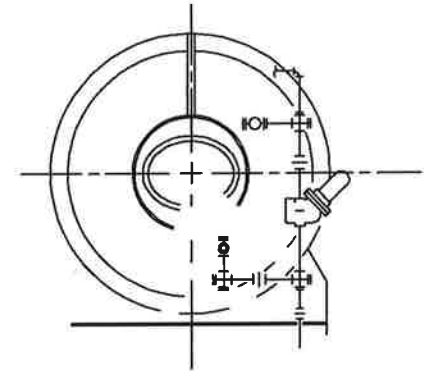
VIEW "A"-"A"



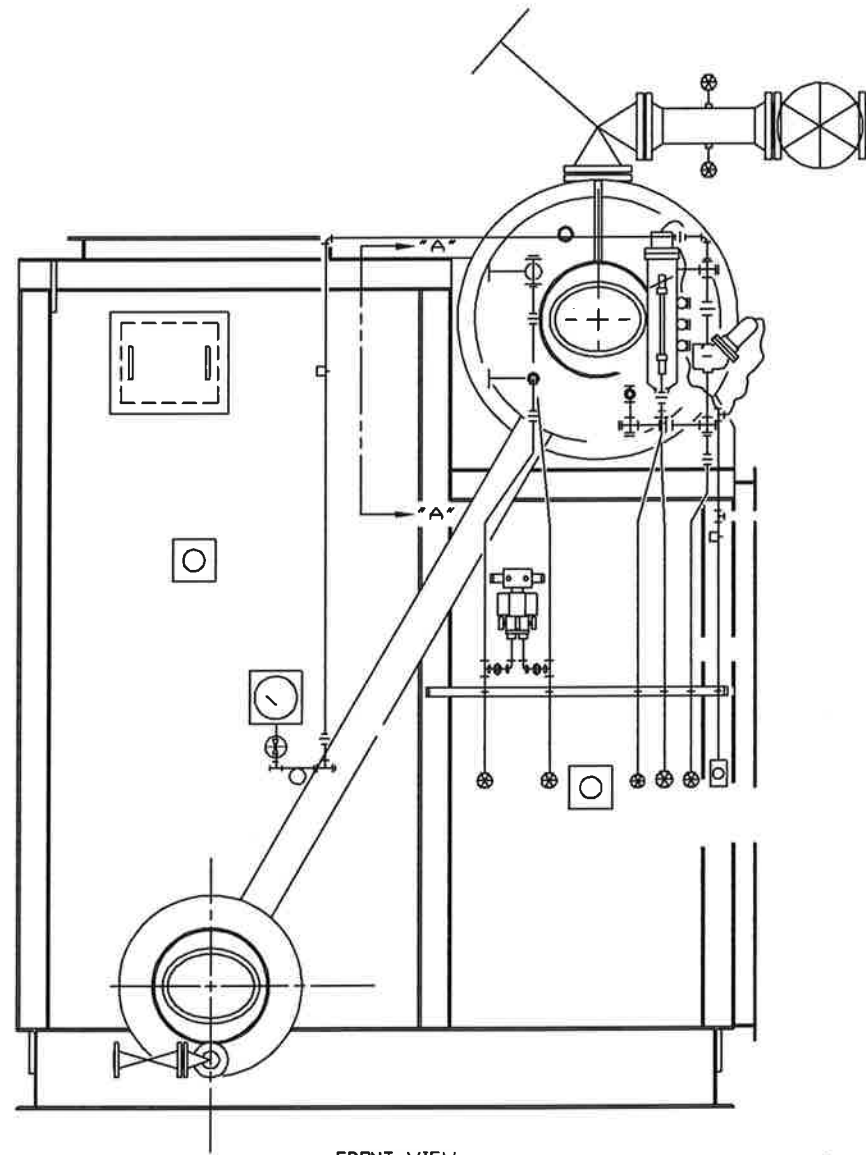
VIEW "B"-"B"



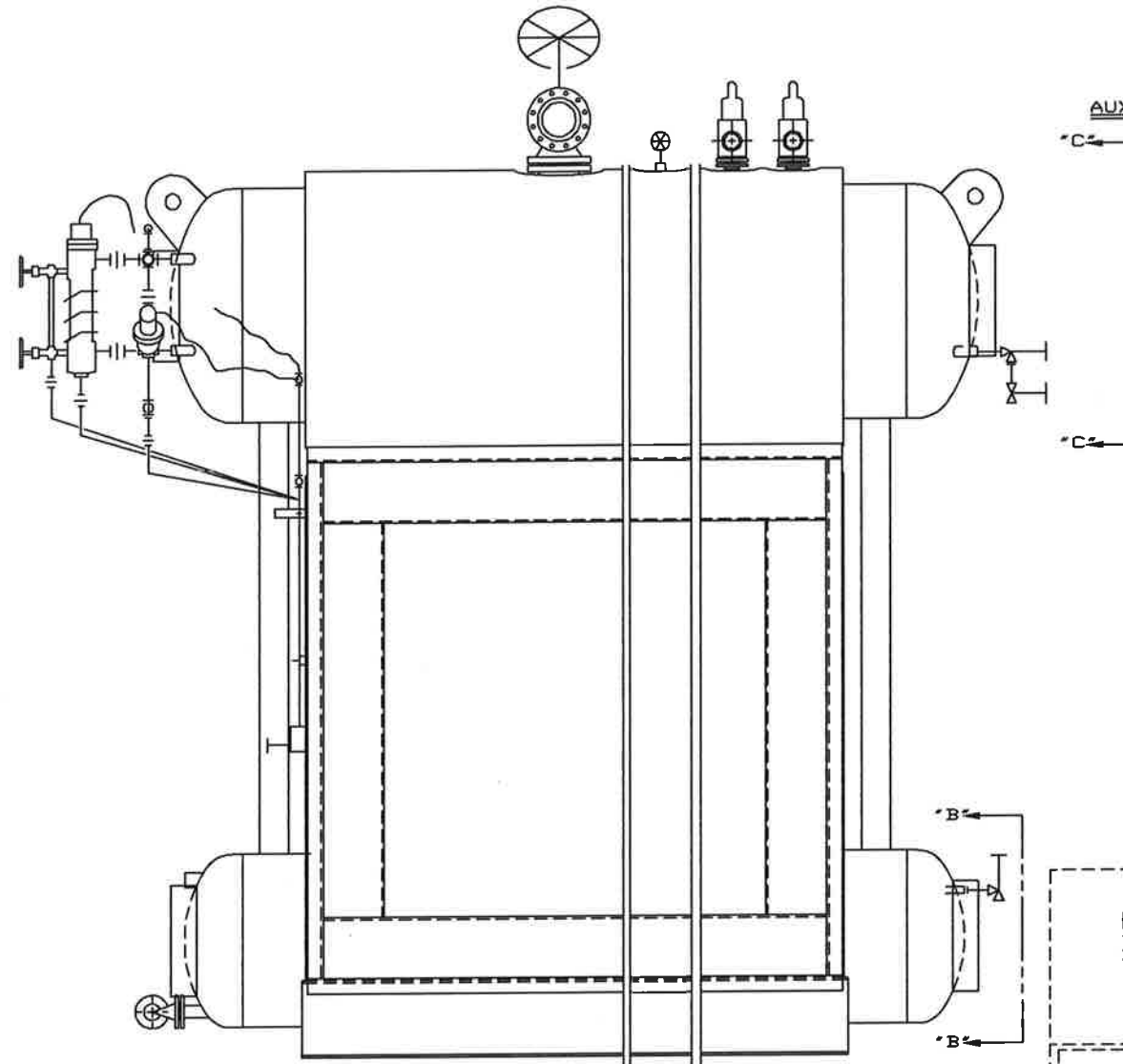
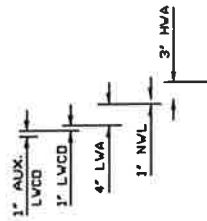
VIEW "C"-"C"



AUX. L.W.C.D. PIPING



FRONT VIEW



SIDE VIEW

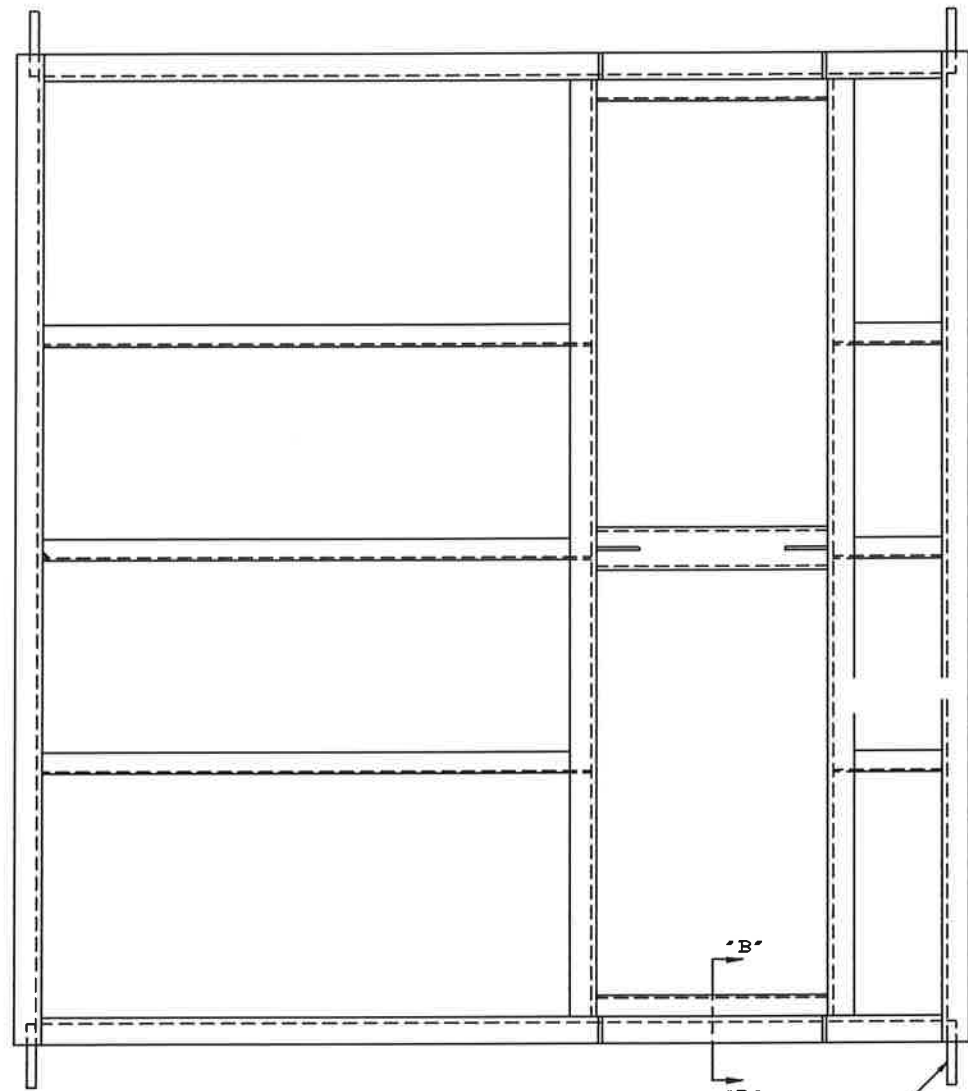
ERI-D92
 X = 33.25
 Y = 21.25

BOILER TRIM PIPING
 SERIES S3-2616

TRENTON STATE COLLEGE
 EWING TOWNSHIP, N.J.

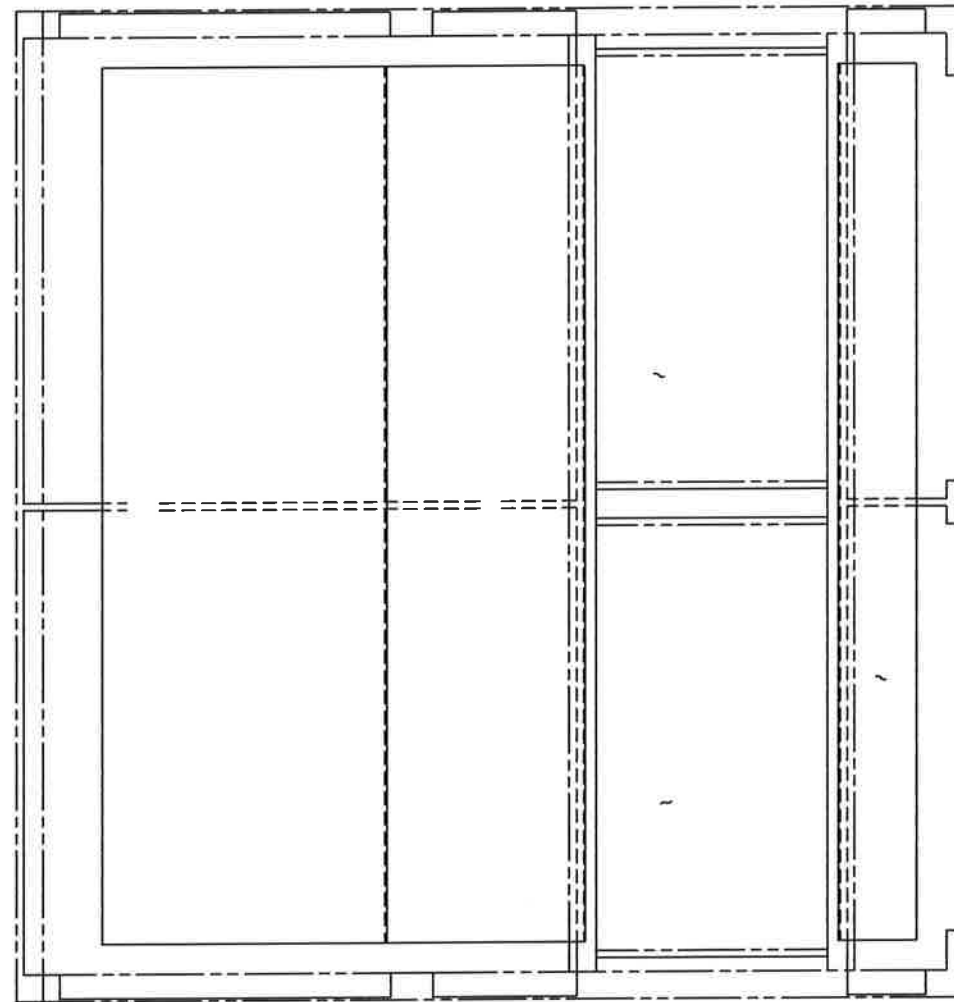
REV.	DATE	DESCRIPTION	DWN	EKD	APP
▲					
▲					
▲					
▲					

SCALE NONE DATE 4-26-93
 DRAWN BY BDH CHECKED APPROVED
 JOB NO. JH-2137 V-3034
 QTY AS NOTED DRAWING NO. 018



BASE FRAME LAYOUT
PLAN VIEW

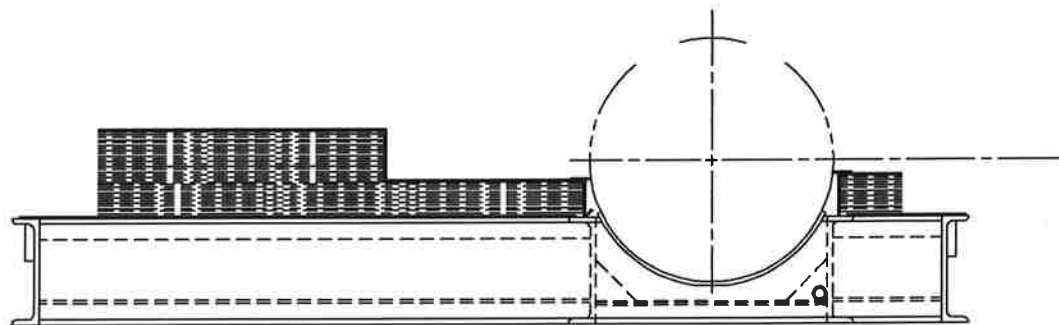
"B"
"B"
SEE DETAIL "A"



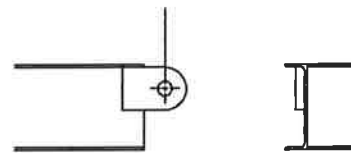
BASE COVERS



SECTION "B"-"B"



END VIEW



DETAIL "A"

REV.	DATE	DESCRIPTION	DWN	CHKD	APP
△					
△					
△	6-15-93	CHNGD. DIM. FROM 9'-11" TO 8'-11" BDH			

ERI-D92
X = 33.25
Y = 21.25

BASE FRAME & COVERS
SERIES S3-2616

TRENTON STATE COLLEGE
EWING TOWNSHIP, N.J.

NONE	4-16-93
BDH	JDD TDM
T.M-2137	V-3034
ONE (1) UNIT REQD	1

SECTION 235830 – EXHAUST STACK ECONOMIZER

PART 1 - GENERAL

1.1 GENERAL

- A. This specification covers the minimum requirements for the mechanical design, materials, fabrication, and assembly of shop-assembled, horizontal tube, bare and extended surface economizers.

1.2 CODES AND STANDARDS

- A. All work and materials furnished will conform to the highest industry standards for material and workmanship, and shall be designed and fabricated in accordance with, but not limited to:
1. ANSI American National Standards Institute
 2. ASME American Society of Mechanical Engineers
 3. AWS American Welding Society
 4. ASTM American Society for Testing Materials
 5. AISC American Institute for Steel Construction
 6. SSPC Structural Steel Painting Codes
- B. All equipment shall comply with federal and state laws and regulations governing the location where the equipment is to be installed.

1.3 SITE CONDITIONS

1. Location : Ewing, NJ
2. Climate: Indoor
3. Ambient Air (Indoor)
 - a. Maximum: 104°F
 - b. Design: 70°F
 - c. Minimum 50°F
4. Humidity: 50%RH
5. Seismic Zone: See Structural Drawing S-001
6. Elevation: 89' AMSL (FF)

1.4 SHIPPING

- A. All separately mounted components, instruments, and ship loose components for field mounting shall be stamped with project number and appropriate tag number.
- B. All equipment and components shall also be identified and/or match marked to assist field assembly and erection. All items shipped shall be accompanied by instructions for storing and protecting and shall be tagged with tag numbers. Code certification papers must accompany the equipment.

- C. The economizer shall be shrink-wrapped to protect it from the elements during shipping.

PART 2 - PRODUCTS

2.1 DESIGN FEATURES

- A. The economizer shall be shop fabricated of the fintube design with drainable tubes and tube sheet or lattice type tube supports and designed to ASME Section I.
- B. Vertical gas flow with horizontal tube sections shall be used.
- C. Carbon steel, serrated fins shall be continuously welded to tubes with high frequency resistance welding process. Tension wrapped, embedded, or brazed finned tubes are not acceptable.
- D. Economizer shall be hydrostatically tested at the factory in accordance with ASME Section I requirements. The ASME test certificate shall be sent to the Purchaser prior to shipping.
- E. The economizer shall be non-steaming throughout specified turndown range.
- F. Economizer tubes shall be SA-210-A1 seamless, medium carbon steel, 2" O.D. with a minimum wall thickness of 0.105".
- G. The economizer shall have a gas tight inner casing constructed of 10 ga carbon steel.
- H. The economizer shall be designed to allow for tube inspection through access door(s). Minimum 16" x 16" access door(s) shall be provided.
- I. Headers shall be SA-106-B seamless, carbon steel, 4" O.D. with a minimum thickness of Sch 80 and furnished with 2" O.D., 300# Class, raised-face, weld-neck flanges.
- J. All tube-to-header connections shall be welded. Compression fittings shall not be acceptable.
- K. Economizer shall include minimum of one 18" sootblower lane with one wallbox and one distal bearing.
- L. Minimum of 10% of all tube welds shall be radiographed.
- M. The economizer shall have support lugs and suitable structural steel support frame to support the economizer and stack from the outlet flange of the Heat Recovery Steam Generator (HRSG) below. The economizer and the structural steel support frame shall be designed to safely support the flooded weight of the unit as well as any static and live loads from the exhaust stack above.
- N. The economizer shall be arranged for counter-current flue gas and water flow and shall have flanged inlet and outlet header connections. Upper header shall have a 3/4" vent and thermowell connection. The lower header shall have a 3/4" drain and thermowell connection.

2.2 PERFORMANCE

- A. The economizer shall be capable of the following performance:
 - 1. Gas Side
 - a. Gas: Combustion Turbine Exhaust Gas
 - b. Gas Mass Flow: 167,053 lb/hr
 - c. Gas Inlet Temperature: 600°F
 - d. Design Pressure: 10 in W.C.
 - e. Allowable Gas side pressure drop: 0.5 in W.C.
 - 2. Tube Side
 - a. Fluid: Boiler Feedwater (Deaerated to 0.005 cc/L oxygen content)
 - b. Fluid Mass Flow: 45,000 lb/hr
 - c. Fluid Inlet Temperature: 225 °F
 - d. Tube-side Operating Pressure: 200 psig
 - e. Hydrostatic Test Pressure: 300 psig
 - f. Allowable tube-side pressure drop: 10 psig
- B. Economizer sizing/performance shall be coordinated with the duct burner manufacturer to ensure proper exhaust gas flows/temperatures are used during both fired and un-fired operations.
- C. Fuel Information
 - 1. Primary Fuel: Natural Gas
 - 2. Secondary Fuel: No. 2 Fuel Oil (ULSD)
 - 3. Percentage of time Secondary fuel fired: approx. 1%
 - 4. Sulfur content in secondary fuel: 15 ppm, Ultra-low Sulfur Diesel (ULSD)
 - 5. Flue gas composition: (vol %)
 - a. Refer to Appendix A

2.3 INSULATION AND LAGGING

- A. All economizer surfaces operating above 140°F, with the exception of headers/piping, shall be insulated and lagged.
- B. Heat loss and personnel protection shall be provided by a system of refractory, insulation and lagging. The setting must, as a minimum, meet OSHA requirements. In general the setting should provide an average cold face surface temperature of 140°F in a 104°F ambient with 2 mph wind.
- C. Economizer shall be insulated with min. 2" thick mineral wool such that outer surface temperature does not exceed 140°F.
- D. Outer lagging shall be 30 ga corrugated galvanized steel.
- E. Insulation and lagging shall be factory installed by the manufacturer for the economizer. The Contractor shall insulate and lag external headers and piping.
- F. Removable insulated covers shall be provided over all equipment manholes, nameplates, and code stampings. Access doors through lagging shall be provided as required.

- G. Components that are covered by factory installed insulation and lagging need not be prime painted. Non-insulated and lagged components shall be prepared and prime painted to manufacturer's standards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting economizer performance, maintenance, and operations.
 - 1. Economizer location indicated on Drawings is approximate. Determine exact location before roughing-in for piping and electrical connections.
- B. Examine roughing-in for flange connections to HRSG and Exhaust Stack transition ductwork and piping to verify actual flanges size(s) and locations of piping connections before installation of economizer.
- C. Examine area for suitable conditions where economizer will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate size and location of frame. Relocate existing services, as required, to install new economizer. Remove overhead roof deck and support steel and temporarily remove exhaust stack and transition duct as required to rig/install new economizer.
- B. Equipment Mounting:
 - 1. Install economizer to outlet flange of HRSG and to inlet flange of exhaust stack providing a leak-proof connection. Install all equipment per Manufacturer's instructions.
- C. Install economizer to permit access for service and maintenance.
- D. Where installing piping adjacent to economizer, allow space for service and maintenance.
- E. Support piping independent of equipment.
- F. Install all parts and materials not factory installed.
- G. Assemble and install economizer trim, components, and accessories that are not factory installed.
- H. Install vent at highest point in exhaust stack economizer piping for start-up/first-fill.
- I. Install drain at lowest point in exhaust stack economizer piping (between isolation valves) for draining of economizer for maintenance.

- J. Install safety relief valve (SRV), within economizer isolation valves, per drawings and route discharge to intermittent blowdown (IBD) tank.
- K. Perform cleaning procedures according to manufacturer's written instructions after completion of hydrostatic testing and before performing other field tests. Following cleaning procedures, economizer shall be flushed until water leaving economizer is clear.
- L. Protect economizer from corrosion.
 - 1. Before filling with water, protect by dry storage method recommended by manufacturer.
 - 2. After filled with water, protect by wet storage method recommended by manufacturer.
- M. Chemical Treatment: Quality of water in economizer shall be maintained by a professional water treatment organization that shall provide on-site supervision to maintain the required water quality during periods of storage, operating, standby, and test conditions.

3.3 PIPING CONNECTIONS

- A. Boiler Feedwater, drain and vent piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect boiler feedwater, drain and vent piping to economizer header flanges with shutoff valves and unions or flanges at each connection.
 - 1. Install minimum flow valve assembly with associated piping from economizer outlet to Intermittent Blowdown (IBD) tank inlet header, as indicated on Project Documents. Provide controls interface with existing control system to operate valve open/closed during start-up sequence as described in Project Documents.
 - 2. Install piping from safety valves and drip-pan elbows. Extend piping from safety valves and terminate to vent outdoors. Terminate vent piping with 45-degree miter to reduce outlet velocity. Extend piping from drip-pan elbow to nearest floor drain.
 - 3. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- C. Where installing piping adjacent to economizer, allow space for service and maintenance.

3.4 CONTROLS CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring between economizer devices and other equipment to interlock operation as required to provide a complete and functioning system.
- C. Connect control wiring between economizer devices and existing Honeywell control system via BACnet to support intended operation sequence(s).

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Inspect field-assembled components and equipment installation, including piping and electrical connections, for compliance with requirements.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Test Reports: Prepare a written report to record the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Economizer will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Set operating controls.
 - 3. Verify safety controls.
 - 4. Verify proper operation.
- B. Report: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Initial findings.
 - 3. Final results.
 - 4. Corrective action taken to achieve compliance with requirements indicated.
 - 5. Date of testing.
 - 6. Name and contact information for person performing testing.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain deaerators.
- B. Video training sessions, and provide electronic copy of video to Owner.

END OF SECTION 235830

APPENDIX A

Volumetric Composition of the Turbine Exhaust Gas for the Existing Solar® Taurus T60-7300

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 1

kW= 5935, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 0.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0006 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

3228.	lbm/hr	FUEL FLOW
1180.75	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
41368.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
107789.	Acfm	ACTUAL EXHAUST FLOW CFm
186984.	lbm/hr	EXHAUST GAS FLOW
28.59	---	MOLECULAR WEIGHT OF EXHAUST GAS
57.02	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.91	3.03	5.87	75.76	14.44	VOLUME PERCENT WET
0.96	3.22	0.00	80.48	15.34	VOLUME PERCENT DRY
2366.	8714.	6912.	138777.	30211.	lbm/hr
0.73	2.70	2.14	42.99	9.36	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 1

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5935, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 0.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
29.24	35.60	10.19	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.08	1.31	0.38	lbm/(MW-hr) (gas turbine shaft pwr)
6.67	8.13	2.33	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C an
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 2

kW= 5584, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 20.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0014 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

3083.	lbm/hr	FUEL FLOW
1127.85	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
40660.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
107559.	Acfm	ACTUAL EXHAUST FLOW CFm
183764.	lbm/hr	EXHAUST GAS FLOW
28.59	---	MOLECULAR WEIGHT OF EXHAUST GAS
58.69	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.91	2.94	5.83	75.72	14.60	VOLUME PERCENT WET
0.96	3.12	0.00	80.41	15.50	VOLUME PERCENT DRY
2324.	8320.	6749.	136341.	30026.	lbm/hr
0.75	2.70	2.19	44.22	9.74	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 2

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5584, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 20.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
27.90	33.97	9.73	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.09	1.33	0.38	lbm/(MW-hr)
			(gas turbine shaft pwr)
6.37	7.76	2.22	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 3

kW= 5220, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 40.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0032 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2955.	lbm/hr	FUEL FLOW
1080.91	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
39583.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
104973.	Acfm	ACTUAL EXHAUST FLOW CFm
178744.	lbm/hr	EXHAUST GAS FLOW
28.57	---	MOLECULAR WEIGHT OF EXHAUST GAS
59.58	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.90	2.89	6.01	75.55	14.65	VOLUME PERCENT WET
0.96	3.08	0.00	80.37	15.59	VOLUME PERCENT DRY
2258.	7961.	6770.	132419.	29333.	lbm/hr
0.76	2.69	2.29	44.81	9.93	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 3

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 5220, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 40.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
26.69	32.49	9.31	ton/yr
0.100	0.122	0.035	lbm/MMBtu (Fuel LHV)
1.12	1.36	0.39	lbm/(MW-hr)
			(gas turbine shaft pwr)
6.09	7.42	2.12	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

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ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 4

kW= 4826, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 60.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0067 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2790.	lbm/hr	FUEL FLOW
1020.62	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
38187.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
101571.	Acfm	ACTUAL EXHAUST FLOW CFm
172136.	lbm/hr	EXHAUST GAS FLOW
28.52	---	MOLECULAR WEIGHT OF EXHAUST GAS
60.79	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.90	2.82	6.41	75.18	14.69	VOLUME PERCENT WET
0.96	3.01	0.00	80.33	15.70	VOLUME PERCENT DRY
2167.	7493.	6973.	127125.	28374.	lbm/hr
0.78	2.69	2.50	45.56	10.17	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 4

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4826, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 60.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
25.11	30.57	8.75	ton/yr
0.100	0.121	0.035	lbm/MMBtu (Fuel LHV)
1.14	1.38	0.40	lbm/(MW-hr)
			(gas turbine shaft pwr)
5.73	6.98	2.00	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 5

kW= 4432, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 80.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0134 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	=	92.7899
Ethane (C2H6)	=	4.1600
Propane (C3H8)	=	0.8400
N-Butane (C4H10)	=	0.1800
N-Pentane (C5H12)	=	0.0400
Hexane (C6H14)	=	0.0400
Carbon Dioxide (CO2)	=	0.4400
Hydrogen Sulfide (H2S)	=	0.0001
Nitrogen (N2)	=	1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2633.	lbm/hr	FUEL FLOW
962.93	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
36508.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
97994.	Acfm	ACTUAL EXHAUST FLOW CFm
163966.	lbm/hr	EXHAUST GAS FLOW
28.41	---	MOLECULAR WEIGHT OF EXHAUST GAS
61.38	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.89	2.77	7.32	74.43	14.60	VOLUME PERCENT WET
0.96	2.98	0.00	80.30	15.75	VOLUME PERCENT DRY
2051.	7024.	7609.	120325.	26953.	lbm/hr
0.78	2.67	2.89	45.71	10.24	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 5

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4432, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature= 80.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
23.53	28.65	8.21	ton/yr
0.099	0.121	0.035	lbm/MMBtu (Fuel LHV)
1.16	1.41	0.40	lbm/(MW-hr)
			(gas turbine shaft pwr)
5.37	6.54	1.87	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

--- SUMMARY OF ENGINE EXHAUST ANALYSIS ---
POINT NUMBER 6

kW= 4004, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature=100.0F

GENERAL INPUT SPECIFICATIONS

ENGINE FUEL: SD NATURAL GAS
29.78 in Hg AMBIENT PRESSURE
60.0 percent RELATIVE HUMIDITY
0.0255 --- SP. HUMIDITY (LBM H2O/LBM DRY AIR)

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4)	= 92.7899
Ethane (C2H6)	= 4.1600
Propane (C3H8)	= 0.8400
N-Butane (C4H10)	= 0.1800
N-Pentane (C5H12)	= 0.0400
Hexane (C6H14)	= 0.0400
Carbon Dioxide (CO2)	= 0.4400
Hydrogen Sulfide (H2S)	= 0.0001
Nitrogen (N2)	= 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

GENERAL OUTPUT DATA

2476.	lbm/hr	FUEL FLOW
905.59	Scfm	FUEL FLOW
20612.	Btu/lbm	LOWER HEATING VALUE
939.	Btu/Scf	LOWER HEATING VALUE
34675.	Scfm	EXHAUST FLOW @ 14.7 PSIA & 60F
94139.	Acfm	ACTUAL EXHAUST FLOW CFm
154699.	lbm/hr	EXHAUST GAS FLOW
28.22	---	MOLECULAR WEIGHT OF EXHAUST GAS
61.58	---	AIR/FUEL RATIO

EXHAUST GAS ANALYSIS

ARGON	CO2	H2O	N2	O2	
0.87	2.71	8.99	73.08	14.35	VOLUME PERCENT WET
0.96	2.97	0.00	80.30	15.77	VOLUME PERCENT DRY
1913.	6529.	8878.	112210.	25166.	lbm/hr
0.77	2.64	3.59	45.32	10.16	g/(g FUEL)

SOLAR TURBINES INCORPORATED
ENGINE PERFORMANCE CODE REV. 4.18.1.20.12
CUSTOMER: TCNJ
JOB ID: PD 46841 CG93686

DATE RUN: 2-Feb-18
RUN BY: Brian C Spencer

NEW EQUIPMENT PREDICTED EMISSION PERFORMANCE
DATA FOR POINT NUMBER 6

Fuel: SD NATURAL GAS Customer: TCNJ
Water Injection: NO Inquiry Number:
Model: TAURUS 60-7300S GSC STANDARD DUAL
Emissions Data: REV. 0.0

The following predicted emissions performance is based on the following specific single point:

kW= 4004, %Full Load=100.0, Elev= 140ft, %RH= 60.0, Temperature=100.0F

NOX	CO	UHC	
25.00	50.00	25.00	PPMvd at 15% O2
21.87	26.63	7.63	ton/yr
0.098	0.119	0.034	lbm/MMBtu (Fuel LHV)
1.19	1.45	0.42	lbm/(MW-hr)
			(gas turbine shaft pwr)
4.99	6.08	1.74	lbm/hr

NOTES:

1. For short-term emission limits such as lbs/hr., Solar recommends using "worst case" anticipated operating conditions specific to the application and the site conditions. Worst case for one pollutant is not necessarily the same for another.
2. Solar's typical SoLoNOx warranty, for ppm values, is available for greater than 0 deg F or -20 deg C, and between 50% and 100% load or gas, fuel, and between 65% and 100% load for liquid fuel except for the Centaur 40). An emission warranty for non-SoLoNOx equipment is available for greater than 0 deg F or -20 deg C and
3. Fuel must meet Solar standard fuel specification ES 9-98. Emissions are based on the attached fuel composition, or, San Diego natural gas or equivalent.
4. If needed, Solar can provide Product Information Letters to address turbine operation outside typical warranty ranges, as well as non-warranted emissions of SO2, PM10/2.5, VOC, and formaldehyde.
5. Solar can provide factory testing in San Diego to ensure the actual unit(s) meet the above values within the tolerances quoted. Pricing and schedule impact will be provided upon request.
6. Any emissions warranty is applicable only for steady-state conditions and does not apply during start-up, shut-down, malfunction, or transient event.

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 RUN BY: Brian C Spencer

TAURUS 60-7300S
 GSC
 STANDARD
 DUAL
 TTD-1S REV. 0.2

DATA FOR MINIMUM PERFORMANCE

*** REFERENCE PIB 156 FOR PURGE REQUIREMENTS ***
 ** PIB 127 HARSH ENVIRONMENT REQUIREMENTS APPLY; SEE GFS OUTPUT FOR FURTHER DETAILS. **
 *** FOLLOW LFS OUTPUT RESULTS FOR SER REQUIREMENTS.
 SoLoNOx DIESEL FUEL SULFUR LIMITS APPLY PER PIB 296. ***

Fuel Type	SD NATURAL GAS						
Elevation	feet	140					
Inlet Loss	in H2O	4.0					
Exhaust Loss	in H2O	10.0					
Engine Inlet Temp.	deg F	0	20.0	40.0	60.0	80.0	100.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0	60.0
Elevation Loss	kW	31	29	27	25	23	21
Inlet Loss	kW	97	92	88	82	77	71
Exhaust Loss	kW	94	92	89	86	83	78
Gearbox Efficiency		0.9820	0.9820	0.9820	0.9820	0.9820	0.9820
Generator Efficiency		0.9740	0.9740	0.9740	0.9740	0.9740	0.9740
Based On 1.0 Power Factor							
Specified Load*	kW	FULL	FULL	FULL	FULL	FULL	FULL
Net Output Power*	kW	5935	5584	5220	4826	4432	4004
Fuel Flow	mmBtu/hr	66.54	63.56	60.91	57.51	54.26	51.03
Heat Rate*	Btu/kW-hr	11211	11382	11668	11918	12244	12745
Therm Eff*	%	30.437	29.977	29.243	28.629	27.867	26.772
Inlet Air Flow	lbm/hr	184051	180970	176070	169617	161592	152467
Engine Exhaust Flow	lbm/hr	186984	183764	178744	172136	163966	154699
PCD	psiG	176.4	172.9	166.6	159.4	152.5	144.1
Compensated PTIT	deg F	1250	1250	1250	1250	1250	1250
PT Exit Temperature	deg F	888	908	912	916	928	944
Exhaust Temperature	deg F	888	908	912	916	928	944

FUEL GAS COMPOSITION (VOLUME PERCENT)

LHV (Btu/Scf) = 939.2 SG = 0.5970 W.I. @60F (Btu/Scf) = 1215.6

Methane (CH4) = 92.7899
 Ethane (C2H6) = 4.1600
 Propane (C3H8) = 0.8400
 N-Butane (C4H10) = 0.1800
 N-Pentane (C5H12) = 0.0400
 Hexane (C6H14) = 0.0400
 Carbon Dioxide (CO2) = 0.4400
 Hydrogen Sulfide (H2S) = 0.0001

ESTIMATES ONLY, NOT GUARANTEED

Nitrogen (N2) = 1.5100

STANDARD CONDITIONS FOR GAS VOLUMES: Temperature: 60 deg F Pressure: 29.92 in Hg
NORMAL CONDITIONS FOR GAS VOLUMES: Temperature: 32 deg F Pressure: 29.92 in Hg

!!! PLEASE, SUBMIT INQUIRY ON GAS FUEL SUITABILITY TO SAN DIEGO !!!

*Electric power measured at the generator terminals.
This performance was calculated with a basic inlet and exhaust system.
Special equipment such as low noise silencers, special filters, heat recovery systems or cooling devices will affect engine performance.
Performance shown is "Expected" performance at the pressure drops stated, not guaranteed.

NOTES

Estimates Only, NOT GUARANTEED

SECTION 235840 – TURBINE EXHAUST DUCT

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This specification covers the minimum requirements for new exhaust duct located immediately downstream of an existing Solar Taurus T60-7300 Combustion Turbine Generator (CTG) and upstream of an existing ERI Heat Recovery Steam Generator (HRSG) with duct burner. The exhaust duct is to be located indoors in an existing cogeneration room located at 2000 Pennington Road, Ewing NJ.

1.2 CODES AND STANDARDS

- A. All work and materials furnished will conform to the highest industry standards for material and workmanship, and shall be designed and fabricated in accordance with, but not limited to:
1. ANSI American National Standards Institute
 2. ASME American Society of Mechanical Engineers
 - Section I - Power Boilers
 - B31.1 - Power Piping
 - PTC 4 - Performance Test Code Fired Steam Generators
 3. AWS American Welding Society
 4. ASTM American Society for Testing Materials
 5. AISC American Institute for Steel Construction
 6. SSPC Structural Steel Painting Codes
 7. NFPA National Fire Protection Association
 8. OSHA Operators Safety and Hazards Association
- B. All equipment shall comply with federal and state laws and regulations governing the location where the equipment is to be installed.

1.3 GENERAL REQUIREMENTS

- A. It is the responsibility of the Seller to ensure that the completed work, and that of their sub-vendors, conforms in all respects with this specification including the applicable codes and standards. If a conflict within this specification or between this specification, the inquiry or purchase order, data sheets, drawings, and other supplemental specifications is discovered by the Seller, the Seller shall identify the conflict in writing for clarification by the Purchaser.
- B. Turbine exhaust duct sizing/layout shall be coordinated with the existing duct burner manufacturer to ensure proper exhaust gas flows/temperatures are considered during both fired and un-fired operations. The existing duct burner manufacturer shall be consulted for coordination of the 'wetted surface layout' and shall provide specific requirements for the turning vanes, etc. in order to maintain proper duct burner performance. Refer to Exhaust Stack Economizer Specification 235830 Appendix A for detailed turbine exhaust gas (TEG)

volumetric flow composition data, operating flow rate(s), design temperature ranges, etc. Note, firing duct located immediately downstream of duct burner shall be designed to meet the requirements of the exhaust gas temperature and flow rates during fired conditions as well as unfired operation.

1. Exhaust duct connection flanges shall be coordinated with the following equipment:
 - a. New Solar Turbines Combustion Turbine Generator (CTG) 30" exhaust bellows connection (*Refer to Appendix A for original exhaust bellows connection size/layout*)
 - b. Existing Solar Turbines Combustion Turbine Generator (CTG) enclosure connection (*Refer to Appendix B for enclosure connection centerline elevation/location*)
 - c. Existing duct burner inlet/outlet flanges
 - d. Existing Heat Recovery Steam Generator (HRSG) inlet flange

C. Submittals - Seller shall submit the following certified drawings and data for review:

1. Turbine exhaust duct layout/coordination drawing set (with section views)
 - a. Coordination drawing set shall include, at a minimum, the following; locations of existing exhaust duct support pads, locations of new exhaust duct supports, locations (elevations/plan) of existing CTG & HRSG flange connections, etc.
 - b. All coordination drawings shall be based upon field verified dimensions for all existing equipment, pads, etc.
 - c. Coordination drawing set shall also clearly indicate proposed rigging path(s) for each individual exhaust duct section with its respective maximum dimension indicated as well as the minimum clearance dimension(s) associated with the overhead door, existing columns/beams, existing conduits, etc.
2. Detailed connection sketches indicating interface with CTG, Duct Burner, and HRSG.
3. Storage Requirements (if applicable).

1.4 PROPOSAL REQUIREMENTS

- A. The equipment furnished shall be, as a minimum, in accordance with the requirements of this Specification and shall be the manufacturer's standard product with any added features needed to comply with the design and performance requirements. Additional or better features which are not specifically prohibited, but which are a part of the manufacturer's standard product, shall be included in the package being furnished.
- B. The Contractor shall identify any exceptions to this specification or its references and include detailed justification. The Contractor shall notify Owner of any modifications to his standard design, which are required in order to meet this specification.
- C. The following is a list of the minimum information required to be submitted with the proposal:
 1. Reference list containing a minimum of three (3) similar projects. List shall include a contact person's name and phone number, locations of installation, application of equipment, and years installed.
 2. Installation description, and estimated crew size and man-hours by craft for field installation. List installation equipment and tools required by installer.
 3. Detailed description of all materials to be used.

PART 2 - PRODUCTS

A. General:

1. Turbine exhaust duct and all associated equipment shall be designed & coordinated based on the requirements related to the existing CTG outlet flange location & elevation as well as the existing HRSG inlet flange location & elevation. All existing equipment locations & dimensions shall be determined/verified in the field by the Contractor.
2. Turbine exhaust duct shall be designed with a floating liner system based on a proven design that the Manufacturer has a minimum of 10 years of experience with.
3. Turbine exhaust duct sizing/layout shall be coordinated with the existing duct burner manufacturer to ensure proper exhaust gas flows/temperatures are considered during both fired and un-fired operations.

B. The following parts will be supplied as new:

1. Turbine exhaust duct with internal insulation and liner*
2. Horizontal, 90° fitting with internal, tailored turning vanes*
3. Transition duct to duct burner with flow distribution grid*
4. Expansion joint (cold) at inlet of duct burner, as required*
5. Firing duct from duct burner to HRSG inlet with observation ports and test ports*
6. Expansion joint (cold) at inlet of HRSG, as required*
7. Support steel

* Indicates equipment which is required to be coordinated with the existing duct burner manufacturer during the design of the turbine exhaust duct.

C. The following components shall be retained and reused:

1. Equipment pads (where possible)

D. The following components shall be furnished by the Owner and coordinated & installed by the Contractor:

1. Expansion joint (hot) at outlet of CTG

E. Materials shall be free from defects which adversely affect the performance or maintainability of individual components or of the overall assembly.

2.2 DETAILED REQUIREMENTS

A. Turbine Exhaust Duct and Insulation

1. Turbine Exhaust Duct

- a. All materials, design, and construction shall be suitable for temperatures and expansions and shall absorb vibrations without leaking, breaking, or displacing the refractory or insulation.
- b. Exhaust duct assemblies shall be provided with access doors to permit the access and maintenance of each section of duct. Access doors shall be adequately sized to permit personnel access and allow for routine maintenance and inspection procedures with the duct.
- c. The entire outer turbine exhaust duct assembly shall be gas tight and designed to withstand the forces associated with a maximum pressure of +/- 20 in. W.C.

- d. Sizing: (Refer Section 1.3.B above)
 - 1) Internal duct velocity shall be maintained between 4,500 fpm to 6,000 fpm maximum throughout the entire design flow range of the CTG exhaust.
 - 2) Note, the project documents assume an internal duct dimension of 5'-0" W x 5'-0" H (although size can be modified slightly based on pressure drop requirements, understanding the maximum velocities indicated above are maintained).
 - e. External shell shall be constructed of 1/4" thick carbon steel with bracing and support legs and shall be primed and finish painted with high-temperature paint designed for the maximum temperature (1,200 °F) of the system.
 - f. Internal liner shall be constructed of 11-gauge 304 stainless steel along the first 18'-0" – 20'-0" from the outlet of the CTG. The remainder of the internal liner up to the HRSG shall be constructed of 11-gauge 304 stainless steel along the entire floor area and 12-gauge 304 stainless steel along the sides and top. All internal liner joints shall overlap in the direction of exhaust flow. Internal liners shall be fixed to exhaust duct using stainless steel studs spaced 11" on center in a square pattern.
2. Insulation
 - a. Insulation shall be Morgan Superwool Plus blanket insulation, or approved equal.
 - b. Minimum insulation thickness shall be 4" thick.
 - 1) Insulation thickness/type shall result in an external turbine exhaust duct temperature of less than 140°F.
 - c. Insulation shall be provided in no less than two layers with staggered joints.

PART 3 - EXECUTION

- A. Field Labor: Contractor to provide all field labor required to perform a complete installation of the new turbine exhaust duct and components.
 1. Demolish existing turbine exhaust duct and installation of new turbine exhaust duct.
 2. Remove and replace existing support steel.
 3. Remove and replace existing expansion joints.
 4. Provide new horizontal, 90° fitting with internal guide vanes, insulation and liner.
- B. Existing pad(s) may be reused for new turbine exhaust duct supports, if locations properly align. If turbine exhaust duct support location is changed, existing concrete pad shall be demolished and the existing concrete floor shall be repaired per the details provided on Structural drawing S-501. New pads shall be coordinated, as required, with new support locations and shall be provided per the detail on Structural drawing S-501. Refer to Structural drawing S-102 for additional information.
 1. The existing location of each exhaust duct support pad shall be field verified and coordinated with the new duct layout support locations.

END OF SECTION 235840

APPENDIX A

(Existing) Solar Turbines Combustion Turbine Generator (CTG)

30" Exhaust Bellows Connection Detail

18

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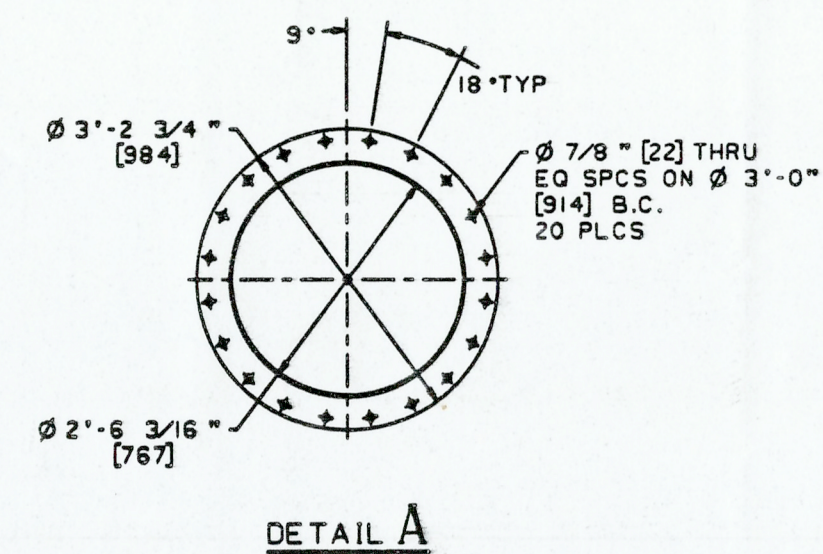
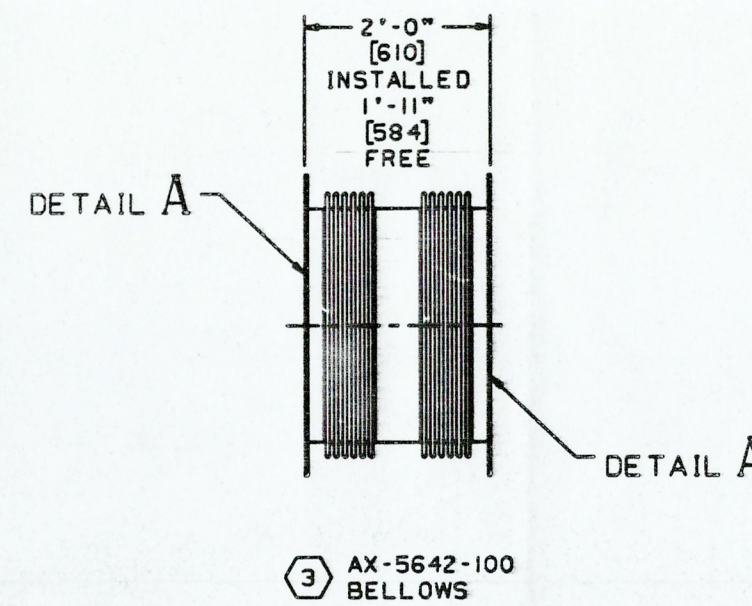
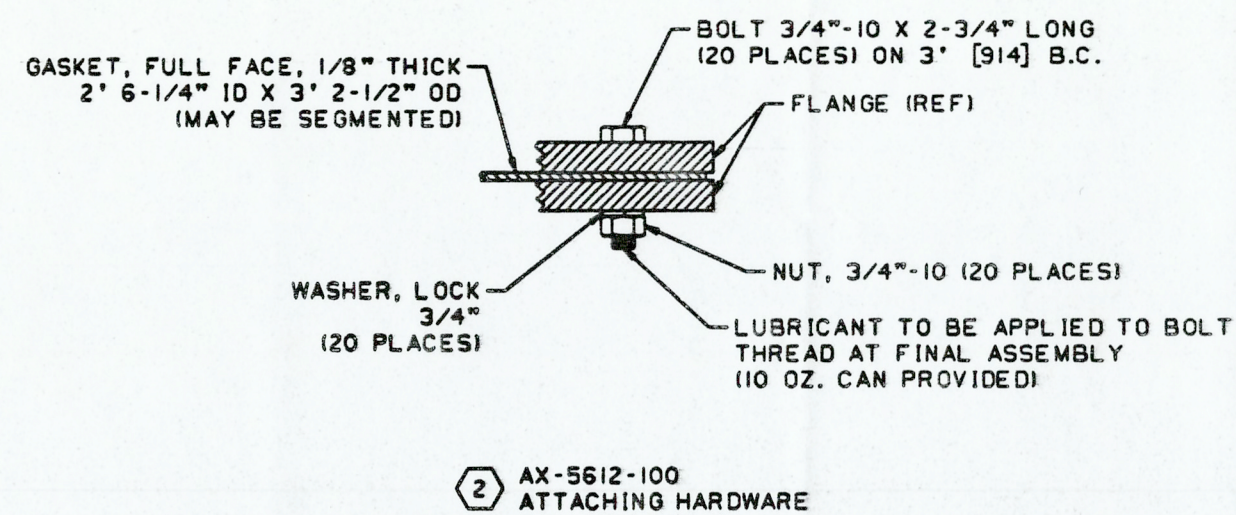
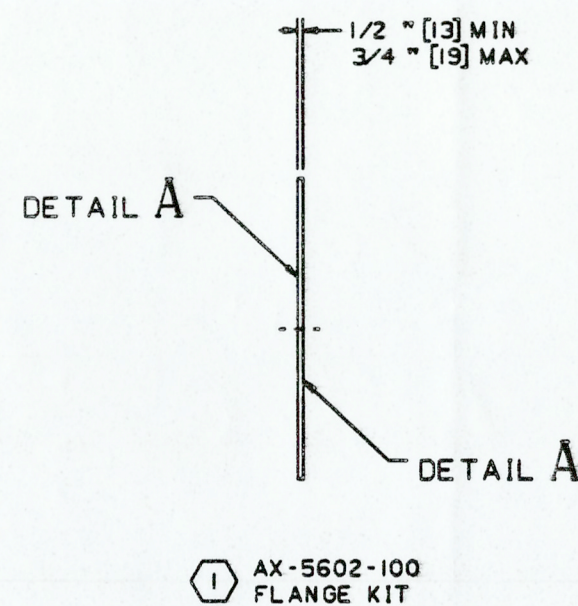
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REV	DESCRIPTION	DATE	APPROVED
1	INITIAL SUBMITTAL	01-27-92	L.M.



NOTES: UNLESS SPECIFIED OTHERWISE

- 1 SEE TABLE 1 FOR COMPONENT DESCRIPTIONS, PART NUMBERS, AND ESTIMATED WEIGHTS.
- 2 COMPONENTS MAY BE EQUIPPED WITH LIFTING LUGS. THE LUGS SHALL BE USED TO LIFT THAT COMPONENT ONLY. TO AVOID DAMAGE, DO NOT ATTEMPT TO LIFT COMPLETE ASSEMBLIES WITH THESE LUGS. USE SLINGS WITH SPREADER BARS OR OTHER APPROPRIATE LIFTING DEVICE. EXHAUST SYSTEM SUPPORT DURING ERECTION SHALL BE FROM BENEATH PACKAGE.
- 3 A. DIMENSIONS SHOWN ARE NOMINAL AND VARIATIONS CAN BE EXPECTED. IT IS RECOMMENDED THAT SUFFICIENT ALLOWANCE BE LEFT FOR MATING FLANGES FOR FINAL FIELD ALIGNMENT. DO NOT SCALE THIS DRAWING, WORK TO DIMENSIONS SHOWN.
 B. ALL EXTERNAL PIPES, DUCTS, AND VENTS CONNECTED TO THE PACKAGE MUST BE FULLY SELF-SUPPORTING. MINIMUM PIPE SIZES ALLOWABLE ARE DETERMINED BY PACKAGE CONNECTION POINT. NO REDUCTIONS ARE ALLOWED.
 C. ALL INTERCONNECT AND SUPPLY PIPING MUST BE THOROUGHLY CLEANED PRIOR TO INSTALLATION.
- 4 DRAWING DIMENSIONED: FEET ° INCHES ° [MM].
- 5 EXPANSION JOINT WILL NOT SUPPORT WEIGHT OF EXHAUST DUCTING.
- 6 TOTAL WEIGHT OF EXHAUST STACK AND DUCTING STACKED VERTICALLY ON THE SILENCER SHOULD NOT EXCEED THE 2000 LBS/908 KGS LOAD CAPACITY OF THE SILENCER. EXHAUST STACK AND DUCTING SHALL BE SITE SUPPORTED AND GUY WIRED BY INSTALLER AT INSTALLATION.
- 7 MOUNTING SUPPORTS CAN BE WELDED TO THE SILENCER. WHEN SUPPORTING THE SILENCER, THERMAL GROWTH MUST BE CONSIDERED.
- 8 REFERENCE MECHANICAL INSTALLATION DRAWING NO. 46841-149777 FOR CONTINUANCE.

COMPONENT LIST - TABLE 1			EST. UNIT WEIGHT	
ITEM	DESCRIPTION	PART NO.	LBS	KGS
1	FLANGE, EXHAUST, 30"	AX-5602-100	60	27
2	HARDWARE, 30" FLANGE, KIT	AX-5612-100	28	13
3	BELLOWS, EXHAUST, 30", 23", 24"	AX-5642-100	202	92

CUSTOMER
**TRENTON STATE COLLEGE
COGENERATION PLANT
TSC CONTRACT NO. 77-0014**

SUBMITTED FOR REVIEW DATE 01-28-93
 CERTIFIED AS NOTED WITH DATE _____
 CERTIFIED FOR CONSTRUCTION DATE _____

SYMBOLS

- ② DENOTES EXTERNAL CONNECTION POINT
- △ INDICATES REFERENCE TO NOTE
- △ DENOTES REVISION
- ② DENOTES COMPONENT OR INSTRUMENTATION
- A/12 DENOTES DRAWING ZONE LOCATION

FSCM NO. **66195**

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PROJECT	DATE	DRAWING TITLE
M. SHOLIN	01-28-93	CENTAUR GENERATOR EXHAUST SYSTEM ACCESSORIES EQUIPMENT
DESIGN	DATE	
L. MERK	01-27-93	
CHECK	DATE	
J. TIGHE	01-29-93	
DRAW	DATE	
O. AMEZCUA	01-29-93	
SOLAR PROJECT IYEN NO.		
2-48841		
CUSTOMER IDENT. NO.		
SEE ABOVE		

DRAWING NO. **46841-AN-0002**

CUSTOMER
SEE ABOVE

DRAWING NO. **46841-AN-0002**

REV SHEET 1 OF 1

APPENDIX B

(Existing) Solar Turbines Combustion Turbine Generator (CTG)
Enclosure Connection Elevation

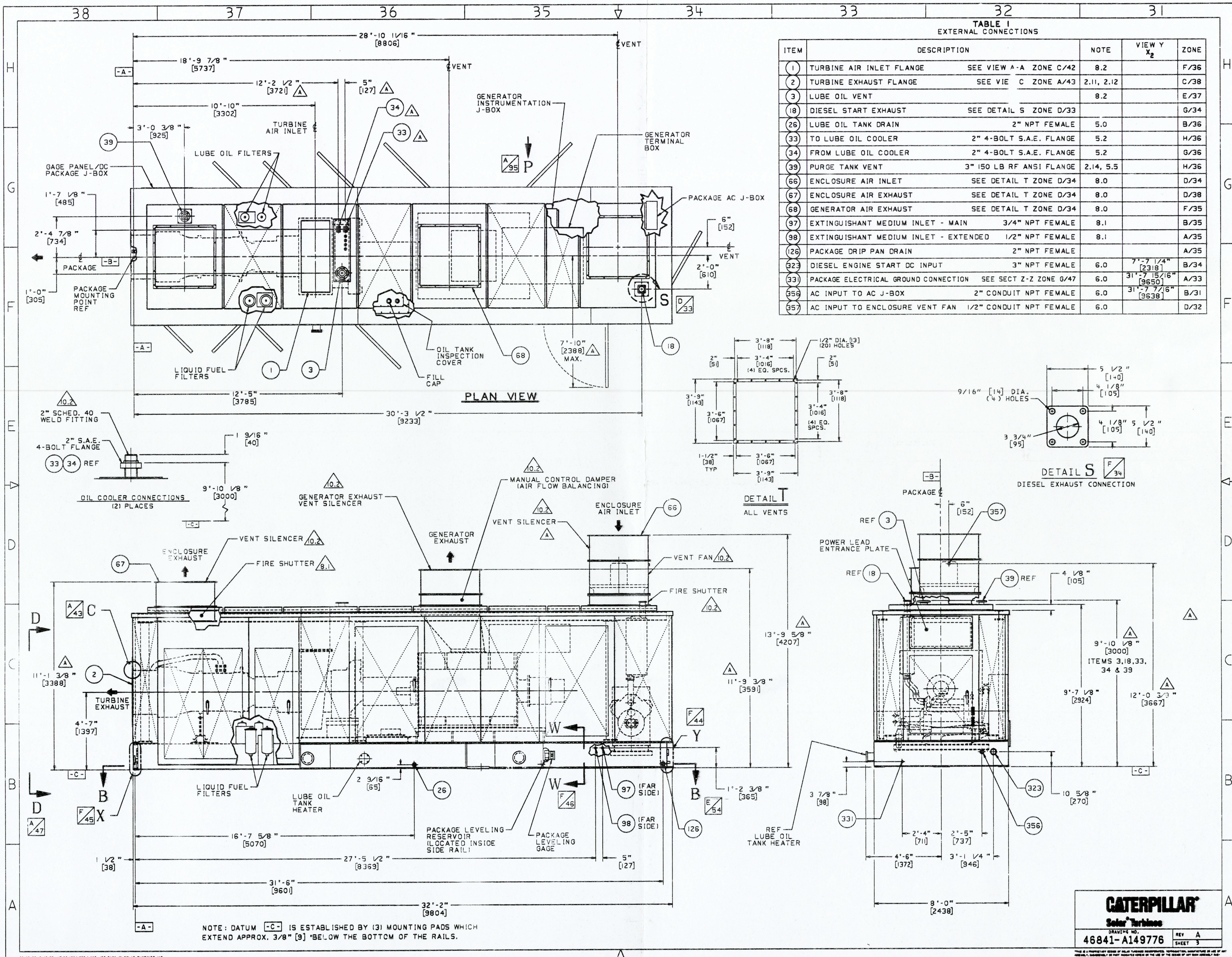


TABLE 1
EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	NOTE	VIEW Y X ₂	ZONE
1	TURBINE AIR INLET FLANGE	SEE VIEW A-A ZONE C/42	8.2	F/36
2	TURBINE EXHAUST FLANGE	SEE VIEW C ZONE A/43	2.11, 2.12	C/38
3	LUBE OIL VENT		8.2	E/37
18	DIESEL START EXHAUST	SEE DETAIL S ZONE D/33		G/34
26	LUBE OIL TANK DRAIN	2" NPT FEMALE	5.0	B/36
33	TO LUBE OIL COOLER	2" 4-BOLT S.A.E. FLANGE	5.2	H/36
34	FROM LUBE OIL COOLER	2" 4-BOLT S.A.E. FLANGE	5.2	G/36
39	PURGE TANK VENT	3" 150 LB RF ANSI FLANGE	2.14, 5.5	H/36
66	ENCLOSURE AIR INLET	SEE DETAIL T ZONE D/34	8.0	D/34
67	ENCLOSURE AIR EXHAUST	SEE DETAIL T ZONE D/34	8.0	D/38
68	GENERATOR AIR EXHAUST	SEE DETAIL T ZONE D/34	8.0	F/35
97	EXTINGUISHANT MEDIUM INLET - MAIN	3/4" NPT FEMALE	8.1	B/35
98	EXTINGUISHANT MEDIUM INLET - EXTENDED	1/2" NPT FEMALE	8.1	A/35
126	PACKAGE DRIP PAN DRAIN	2" NPT FEMALE		A/35
323	DIESEL ENGINE START DC INPUT	3" NPT FEMALE	6.0	7'-7 1/4" [2318] B/34
331	PACKAGE ELECTRICAL GROUND CONNECTION	SEE SECT Z-Z ZONE G/47	6.0	31'-7 5/16" [9650] A/33
356	AC INPUT TO AC J-BOX	2" CONDUIT NPT FEMALE	6.0	31'-7 7/16" [9638] B/31
357	AC INPUT TO ENCLOSURE VENT FAN	1/2" CONDUIT NPT FEMALE	6.0	D/32

NOTE: DATUM **C-C** IS ESTABLISHED BY (3) MOUNTING PADS WHICH EXTEND APPROX. 3/8" [9] BELOW THE BOTTOM OF THE RAILS.

CATERPILLAR
Solar Turbines
DRAWING NO. 46841-A149776
REV A SHEET 3

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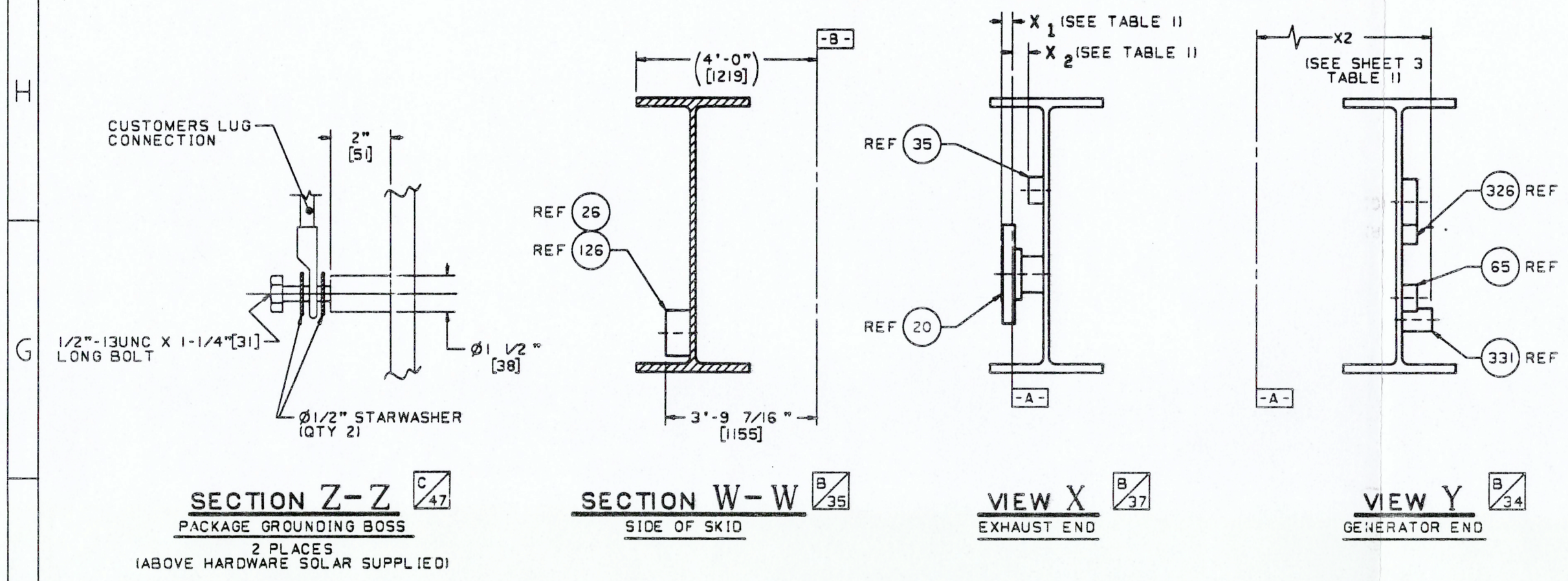
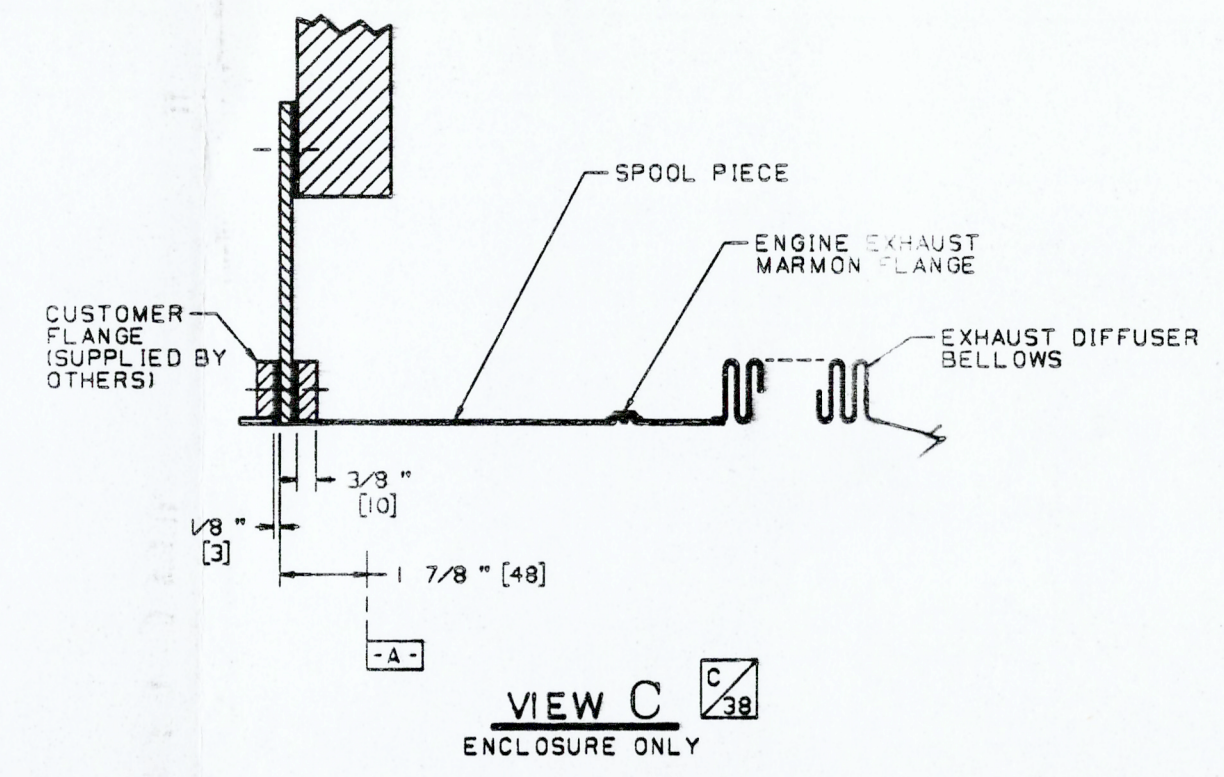
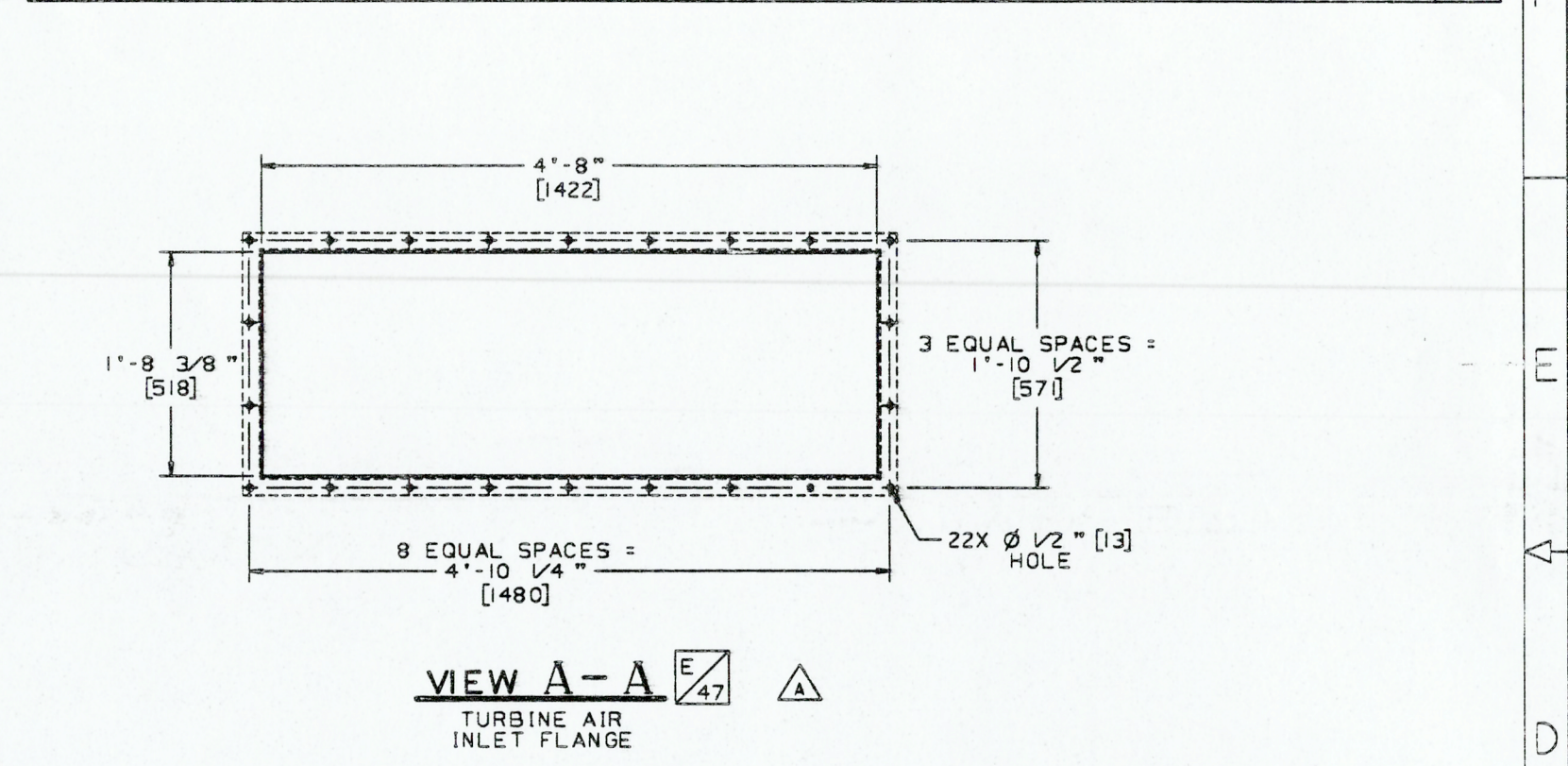
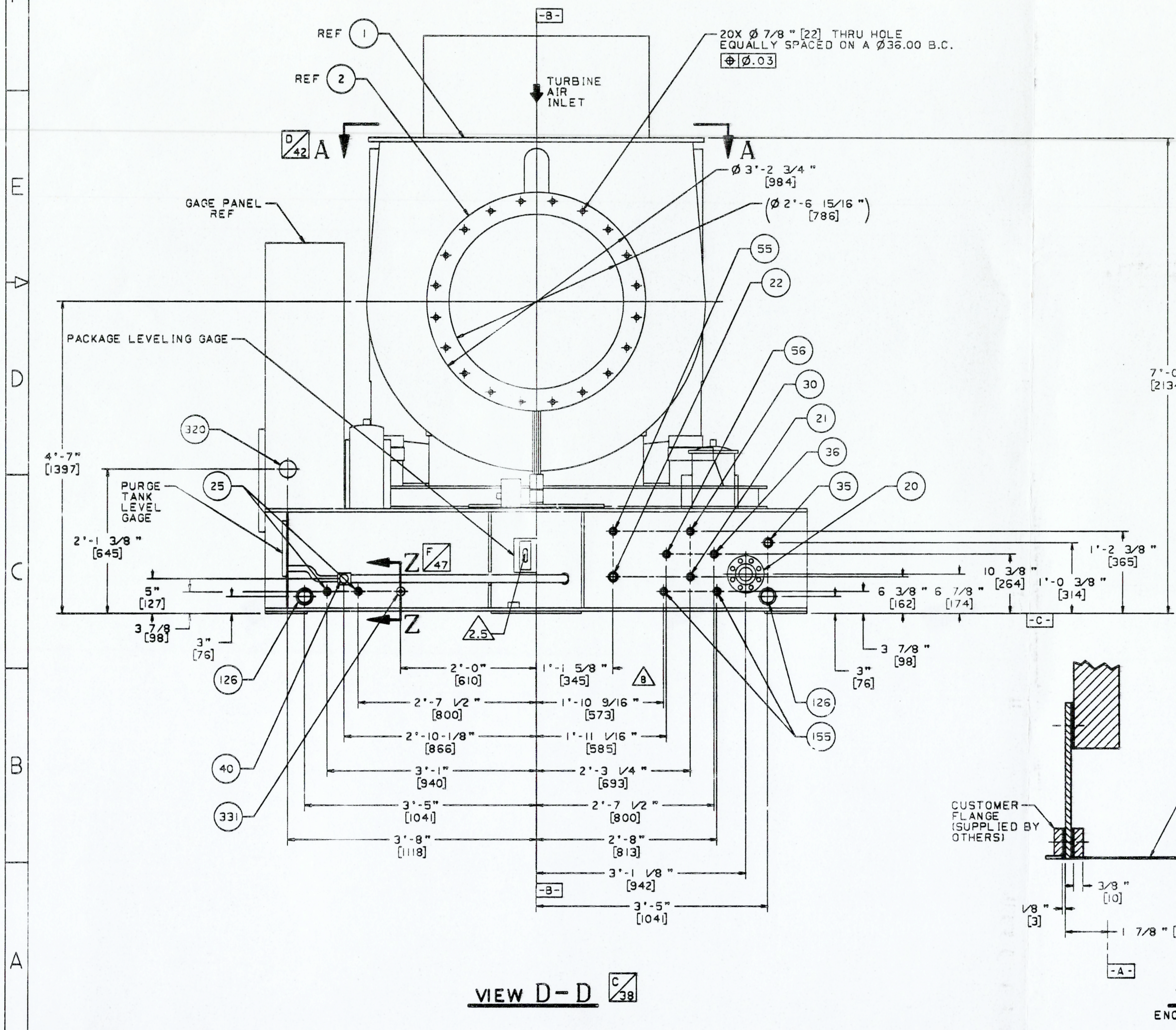


TABLE I
EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	NOTE	VIEW X		ZONE
			X ₁	X ₂	
20	GAS FUEL INLET 2" 300 LB ANSI RF FLANGE	4.0, 4.3	3/4" [18]		D/45
21	WATER WASH SUPPLY INLET 3/4" NPT FEMALE	9.0		1/16" [27]	D/45
22	ENGINE AIR INLET DUCT DRAIN 1" NPT FEMALE	9.2		1/8" [27]	E/45
25	LUBE OIL FILTER DRAIN 3/4" NPT FEMALE			1/16" [27]	C/48
30	PILOT VALVES AIR/GAS VENT 3/4" NPT FEMALE	4.2		1/16" [27]	D/45
35	LIQUID FUEL INLET 1" NPT FEMALE	4.1		1/16" [27]	D/45
36	LIQUID FUEL ATOMIZING AIR INLET 3/4" NPT FEMALE	4.4		1/16" [27]	D/45
40	PURGE TANK DRAIN 3/4" NPT MALE	2.14			B/48
55	WATER INJECTION INLET 3/4" NPT FEMALE	10.1		1/16" [27]	E/45
56	WATER INJECTION PURGE 3/4" NPT FEMALE	10.0		1/16" [27]	D/45
126	PACKAGE DRIP PAN DRAIN (2 PLACES) 2" NPT FEMALE			1/16" [27]	B/45
155	LIQUID FUEL FILTER DRAIN 3/4" NPT FEMALE			1/16" [27]	B/45
320	MAIN PACKAGE JUNCTION BOX 3" CONDUIT NPT FEMALE	6.0		3/16" [78]	D/48
331	PACKAGE ELECTRICAL GROUND CONNECTION 1/2"-13 X 1 1/4" LG	6.0		1/16" [2]	B/48



CATERPILLAR
Solar Turbines

DRAWING NO. 46841-A149776

REV B SHEET 4

SECTION 260500 – GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Construction Phasing Plan and building outages
2. Wiring Devices
3. Equipment Submittals and Shop Drawings
4. Field Acceptance Testing of Equipment and Systems
5. TCNJ Personnel Instruction
6. Operation and Maintenance Manuals

1.3 CONSTRUCTION PHASING PLAN AND BUILDING OUTAGES

- A. Installation of branch circuits from existing switchboards, panelboards and MCCs shall be scheduled with TCNJ at least one week in advance.

1.4 EQUIPMENT SUBMITTALS AND SHOP DRAWINGS

- A. Each submittal shall be required to bear the review stamp of each contractor associated with the processing of the document. The processing of shop drawings shall follow contractual relationships between the Prime Contractor and all Subcontractors.
- B. Each shop drawing submitted shall be identified by the following:
 1. Project Name
 2. Specification Section
 3. Drawing Numbers
- C. Shop drawing data shall include but not be limited to:
 1. Manufacturer's catalog designation.
 2. Complete data and wiring diagrams.
 3. Dimensions, capacities, ratings, weights, materials, finishes, and storage conditions.
 4. Recommended installation procedures, performance, and conditions of performance, testing, and certifications if required.

- D. Shop drawings which require coordination of two or more trades shall be required to bear the review stamp of the coordinating trades.
 - 1. All submittals depicting multiple options or configurations shall be marked to completely identify the specified options and/or configurations. This includes all electronic submittals, which shall be identical to all submitted paper copies.

1.5 FIELD ACCEPTANCE TESTING OF EQUIPMENT AND SYSTEMS

- A. Contractor shall perform a field acceptance test demonstrating components and system performs according to project and manufacturers requirements. Notify TCNJ minimum one week prior to test. The test shall be documented and included in close-out documents.
- B. Records of all torque wrench calibration and settings shall be provided
- C. Check and document phase rotation of all three phase motors before disconnection and verify after new power source is connected. Document this testing and submit to TCNJ as part of closeout documents.
- D. Submit list of equipment and tests to be performed for TCNJ's review four (4) weeks prior to test.

1.6 TCNJ PERSONNEL INSTRUCTION

- A. The Contractor shall provide a technical agent to fully instruct the representatives of TCNJ in all details of operation of the equipment installed under this contract. Training sessions should be scheduled with the appropriate University personnel (usually, Electrical Operators and Electricians - "ELOPs") and require a minimum of two weeks' notice.
- B. Training shall be conducted by the manufacturer's factory trained personnel who are knowledgeable of the specific project and actual operating conditions and requirements.
- C. Operator training shall be conducted before the equipment is placed into energized operation. The manufacturer shall produce a test procedure that covers all modes of operation and demonstrates all interlocks for the equipment provided.

1.7 OPERATION AND MAINTENACE MANUALS

- A. Contractor shall provide three (3) copies of documents in Adobe or other acceptable format on DVD. The instructions shall be prepared by section and contain detail operating and maintenance data including wiring and piping diagrams. Each section shall be labeled and include detailed parts list data and the name, address and phone number of the nearest supply source. The manuals must provide all the information required to run the building and maintain systems and equipment efficiently.
- B. The manufacturer's standard specification sheets, if generalized in any way, shall be clearly marked to show exactly which item has been supplied, what ratings are applicable, etc., and the

job designation for that item shall be noted on manufacturer's specification sheet which includes all details for the specific equipment.

- C. If there are differences between pieces of equipment, include a specification sheet for each, properly marked.
- D. Include control diagrams, single-line diagrams, interconnection (point to point) wiring diagrams, sequence of operations, and service instructions.
- E. Provide one section for preventive maintenance procedures (recommended materials and procedures, frequency, etc.).
- F. Include Contractor's phone numbers and any other references required to obtain warranty service.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 260500

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SECTION 260501 – ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers the labor and materials necessary for the Work associated with the demolition of the electrical systems as shown on Drawings and specified herein.
- B. Equipment and systems to be removed include but are not limited to:
 - 1. Low voltage disconnect switches
 - 2. Low voltage conduit and wiring
 - 3. 480V MCC starter buckets
- C. The Engineer will select which materials and equipment shall remain the property of TCNJ. The remaining materials shall become the property of the Contractor and shall be immediately transported away from the work site at the Contractor's expense. The Contractor shall identify each item before removal and shall take precautions to prevent damage to the rest of the existing materials and equipment.
- D. The Drawings for the demolition are included as references in the Contract Documents. The Contractor shall inspect the facilities to be demolished prior to submitting a Bid, to satisfy themselves as to the nature and location of Work.
- E. The Contractor shall obtain all permits necessary for the Work specified herewith and disposal of the demolished materials.
- F. The Contractor shall test and identify all materials requiring special handling during demolition and disposal. These shall include, but not be limited to, lead-based paint and asbestos materials. Disposal of demolished material shall follow all applicable codes and regulations.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Contractor shall provide all materials and equipment in suitable and adequate quantity as required to safely accomplish the Work shown, specified herein, and as required to safely complete the project.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Perform the Work in a manner to avoid damaging those parts of the structure or facility that are not intended to be removed. If, in the opinion of the Engineer, the method of demolition used may endanger or damage parts of the structure, or affect the satisfactory operation of the facilities, promptly change the method when so notified by the Engineer.
- B. Remove all materials associated with existing equipment that is to be removed or relocated, unless noted otherwise.
- C. Cut off concealed or embedded conduit, boxes, or other materials a minimum of 3/4" below final finished surface. Patch to match existing surfaces.

3.2 DISPOSAL

- A. Remove all rubble and waste material from the site. This will include, but not be limited to, the following: equipment, electrical, and other debris. Accomplish disposal offsite in accordance with all federal, state, and local laws.
- B. Areas in which demolition operations are being conducted are to be cleaned upon conclusion of daily work, outage period work, or a specific work period. All rubble and waste material shall be removed from each work area in order to provide a clean area for plant operations.
- C. Areas in which demolition operations are conducted and in which new work is to be performed, shall be initially cleaned by the Contractor in order to accommodate the new work.

3.3 SALVAGE

- A. TCNJ shall pick from equipment and materials within the limits of demolition for their stock, any remaining items, will become the property of the Contractor.

END OF SECTION 260501

SECTION 260515 – WIRES AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Contractor shall furnish all labor, equipment, materials, and incidentals necessary to install wires and cables and other related work complete, as indicated on the drawings and as specified.

1.3 PRODUCT SECTION INCLUDES

- A. Wire and cable (600V)
- B. Splices (600V)
- C. Ground wire
- D. Plastic cable ties
- E. Electrical tapes

1.4 REFERENCE

- A. The following publications form a part of this specification to the extent referenced. The publication is referred to in the text by the basic designation only.
- B. Insulated Cable Engineers Association (ICEA) Publication

1.5 QUALITY ASSURANCE

- A. Wire and cable shall be delivered and stored on site in factory assembled packaging or on factory reels. All cable ends for 600 volt cable No. 4/0 and larger and all medium voltage cable shall be sealed with heat shrinkable sealant coated end caps. Hand taped caps are not acceptable. Use Tyco-Raychem ESC series or approved equal.
- B. Product shall be UL listed and labeled.

1.6 SUBMITTALS

- A. Product for all listed products in this section.

- B. Manufacturers' Instructions:
 - 1. Installation instructions for each type of splicing kit
 - 2. Installation instructions for each type of termination kit

1.7 CONDUCTOR COLOR CODING

- A. Provide all single conductors and individual conductors of multi-conductor power cables with integral insulation pigmentation of the designated colors, except conductors larger than No. 6 AWG may be provided with color-coding by wrapping the conductor at each end and at all accessible locations with vinyl tape. Where this method of color-coding is used, wrap at least six full overlapping turns of tape around the conductor covering an area 1-1/2 to 2 inches wide at a visible location.
- B. Phase sequences A, B, and C implies the direction of clockwise phase rotation.
- C. Color shall be green for grounding conductors #6 and smaller.

PART 2 - PRODUCTS

2.1 WIRE AND CABLE (600 VOLT)

- A. Building wire: Single annealed copper conductor insulated wire; 98 percent conductivity at 20 degrees C. Wires and cables manufactured more than 12 months prior to date of delivery to site shall not be used.
 - 1. Solid conductor for feeders and branch circuits 12 AWG and smaller; larger conductors shall be stranded.
 - 2. Stranded conductors for tray, control and communication circuits.
 - 3. Insulation Voltage Rating: 600 volts.
 - 4. Insulation Temperature Rating: 90 degrees C.
 - 5. Insulation Material (building wire): Thermoset – Type XHHW-2
 - 6. Acceptable manufacturers – building wire:
 - a. General Cable Corporation
 - b. Southwire Company
 - c. Cerro Wire

2.2 SPLICES (600 VOLTS)

- A. For above grade cable and conductor splices, provide compression type in-line splices with pre-molded GEL cover or heat shrinkable tubing cover. Cover with Tyco Raychem Gelwrap or heat shrinkable tubing 'WCSM' or approved equal.
- B. For below grade splices in pull boxes, manholes or cable vaults, provide compression type in line splices for two-way connections and C type compression connectors for taps or three-way connections. Cover all below grade splices with Tyco Raychem heat shrinkable tubing 'WCSM' or type CRSM-CT cable tap encapsulation kits.

2.3 TERMINATIONS (600 VOLTS)

- A. 600 volt terminations shall be crimp compression type bolted to equipment or set screw terminal type in equipment not suitable for compression connectors. Conductors, No. 12 and smaller shall utilize eye type compression set terminator when termination is to a bolted or set screw type terminal block.

2.4 GROUND WIRE

- A. Ground wire shall be soft drawn bare copper, sized as noted on the drawings, where direct buried or run with medium voltage cable in pull boxes, manholes, or cable vaults.

2.5 PLASTIC CABLE TIES

- A. Cable ties shall be nylon or equivalent, locking type. Use Panduit EH cross-section, PLT locking type, 250 pound loop tensile strength or approved equal.

2.6 ELECTRICAL TAPES

- A. Electrical tapes shall be as follows:
 - 1. Insulating tape shall be 3M Scotch Super 33+ vinyl electrical type or equal.
 - 2. Fire proofing tape shall be 3 inch wide, Scotch 3M No. 77 Fire and Electric Arc Proofing tape or equal.
 - 3. Glass cloth electrical tape shall be Scotch 3M No. 69 or equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Wire and cable shall be installed in conduits and ductbanks as shown on the contract drawings. The installation shall include preparing of conduits, pulling, laying and securing of wires and cables and making conductor splices, terminal connections to equipment and devices, and performing cable tests.

- B. Conduit runs shall be cleaned and free from obstructions and sharp corners prior to cable installation. A mandrel, followed by a clean, dry, tight-fitting rag shall be drawn through the conduit immediately before installing the wire or cable. The wires and cables shall be installed so that there will not be cuts or abrasions in the insulation or protective covering or kinks in the wires and cables. Gradual and uniform pulling stresses shall be applied to wires and cables. Where a lubricant is needed as an aid to the pulling of wires and cables, use only compounds acceptable to, or approved by, the cable manufacturer. Cable guides shall be installed as required in order to prevent the cable from being damaged by sharp surfaces.

3.2 CABLE PULLING

- A. The contractor shall submit cable pulling calculations performed by the cable manufacturer based on actual conduit installation. The calculations shall clearly indicate that cable parameters are not exceeded for the specific conduit configuration. Splices shall be installed in manholes where required such that the cable manufacturer's maximum pulling tension, sidewall pressure and other parameters are not exceeded during cable installation. Cable pulling plans and calculations shall be submitted to the Company ten (10) working days prior to work.
- B. Wire and cable shall be inspected for damage during installation.
- C. Wire and cable pulling equipment shall be equipped with an accurate gauge to allow continuous monitoring of pulling tension. Pulling tension shall not exceed manufacturers maximum recommended values for pulling tensions and sidewall pressures. Record these values and submit log to the Engineer and include in O&M manual.
- D. Wire and cable shall be pulled using a tugger or winch, similar to Greenlee power puller, Ideal pulling kit, or vehicle mounted electric winch. Vehicles shall not be utilized for pulling cable.
- E. The wire and cable shall be fed through a cable feeder or over sheaves in such a way that it does not contact the edge of the manhole or duct. Bending radius shall not be less than 12 times the conductor or cable diameter. The cable shall be fed straight into the duct in the pay-off manhole and straight out of the duct at the pulling manhole.
- F. Wire and cable shall be lubricated at pay-off end with cable manufacturer approved cable pulling compound.
- G. The pay-off reel shall be tended throughout the pulling process.
- H. The rate of pull shall be constant and not exceed 50 feet per minute.
- I. Prior and during cable pulling, Contractor shall pump water from pull boxes, manholes and cable vaults and keep them dry until the project is completed to allow subsequent inspections.
- J. Wire and cable installation may occur in some manholes, pull boxes or cable vaults with other energized wire and cable. Contractor shall perform work in a safe manner and conform to all safety regulations.

3.3 TERMINATIONS (600 VOLTS)

- A. All terminations shall be secure and tightened in accordance with the manufacturer's recommendations.

3.4 SPLICES (600 VOLTS)

- A. Splices in conductors No. 12 AWG and smaller shall be made with "Scotchlok" insulated connectors of proper size for conductors being spliced. Connectors shall be PE taped. Splices in conductors No. 10 AWG and larger shall be made with pressure type solderless connectors. The splice area shall be insulated with heat shrink to provide equal or greater insulation than the original.
- B. Connectors and terminal lugs shall be used for terminating stranded conductors #6 AWG and larger and shall be T&B, Ilco, or approved equal solderless connectors.
- C. Wire in panels, cabinets, pull boxes and wiring gutters shall be neatly grouped, strapped together with T&B Model Tyrap cable strap or laced with No. 12 stranded lacing twine and fanned out to the terminals.

3.5 CABLE SUPPORTS AND PROTECTION

- A. Cable entering equipment shall be securely clamped or secured inside the equipment. Cable supports shall be installed in the equipment for supporting the incoming cable from the point of entrance to the point of termination.
- B. Attach cables and splices to support assemblies by using nylon cable ties, Panduit EH, PLT locking type, 250 pound loop tensile strength rating.

END OF SECTION 260515

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SECTION 260529 – HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

- A. RMC: Rigid metal conduit.
- B. LFMC: Liquid-tight Flexible Metallic Conduit

1.4 SUBMITTALS

- A. Product Data: Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of electrical support component used.
 - 1. Annotate to indicate application of each product submitted and compliance with requirements.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five times the applied force.
- B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly.
 - 1. Manufacturers:
 - a. Cooper B-Line; a division of Cooper Industries
 - b. ERICO International Corporation
 - c. Allied Support Systems; Power-Strut Unit
 - d. Thomas & Betts Corporation
 - e. Unistrut; Tyco International, Ltd.

- f. Or approved equal
- 2. Finishes:
 - a. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3 (Metal Framing Manufacturers Association).
- 3. Channel Dimensions: Selected for structural loading
- C. Raceway and Cable Supports: As described in NECA 1
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers:
 - 1) Cooper B-Line; a division of Cooper Industries
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Construction Products
 - 5) MKT Fastening, LLC
 - 6) Powers Fasteners
 - 7) Or approved equal
 - 2. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325
 - 5. Toggle Bolts: All-steel springhead type; ASTM Standard E 488
 - 6. Hanger Rods: Threaded steel; ANSI/MSS SP-58, SP-69

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

- C. Powder-Driven Threaded Studs: Powder – Driven devices shall not be used unless specifically approved by the TCNJ Engineering Department.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 for installation requirements, except as specified in this Article.
- B. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 2. To Existing Concrete: Expansion anchor fasteners
To Steel: Beam clamps
- C. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars. Provide minimum horizontal and vertical separation between holes and rebar.
- D. Walls of light weight construction (including all stud/drywall type construction) shall be reinforced with surface mounted “unistrut” strut before hanging electrical equipment.

END OF SECTION 260529

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SECTION 260533 – RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section "Hangers and Supports for Electrical Systems" for raceways, boxes, enclosures, and cabinets.

1.3 DEFINITIONS

- A. LFMC: Liquid-tight flexible metal conduit
- B. RMC: Rigid metal conduit

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction or existing appurtenances that penetrate ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose

4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company
7. O-Z Gedney; Unit of General Signal
8. Wheatland Tube Co.
9. Or approved equal

B. Rigid Metal Conduit: ANSI C80.1.

1. Galvanized Rigid (Steel) Conduit (GRC)
2. Fittings: Rigid steel conduit fittings shall be of the threaded type or compression only. Zinc based cast fittings are not permitted – use cast iron or cast steel.

C. LFMC: Flexible steel conduit with PVC jacket; Underwriters Laboratories Standard ANSI / UL-360

D. Fittings: NEMA FB 1; compatible with conduit and tubing materials

2.2 STANDARD WIRING DEVICE WALL BOXES AND ENCLOSURES

A. Manufacturer:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. Thomas & Betts Corporation.
8. Or approved equal.

B. Sheet Metal Pull and Junction Boxes: NEMA OS 1.

2.3 WIREWAYS, PULLBOXES AND JUNCTION BOXES

A. Wireways and boxes 1,500 square inches (length by width) and smaller shall be constructed with No. 16 code gauge metal, fully seam welded, and have a bolt-on cover using stainless steel hex-head 10/32 nuts, bolts, screws, washers, etc., minimum 8” on center. The enclosure shall be U.L. 50 listed and labeled. Wireways and boxes greater than 1,500 square inches (length X width) shall be constructed with No. 14 code gauge metal with same requirements. Submit shop drawings to the Commission for approval prior to fabrication.

B. Use the following enclosure type and material:

1. Indoor Locations: NEMA 4X, stainless steel with ANSI 61 gray polyester urethane powder finish inside and out.

C. Wireway used to splice and extend conductors into new 208V Volt switchboards shall be constructed per paragraphs 2.3A and B of this section.

D. Provide gaskets for covers of boxes in damp or wet locations.

- E. Manufacturer: Penn Panel and Box Company, Collingdale, PA, or approved equal.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors:

1. Threaded rigid galvanized steel conduit only, except for A2 (below).
2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC not to exceed 18”.
3. Exposed conduit in non-finished areas (mechanical/electrical equipment rooms, storage rooms, etc.) shall be RGS conduit.
4. Conduit shall be supported independently from ceilings or structural steel, not by hangers with other services (e.g. pipes, ductwork, or other mechanical systems).

B. Outdoors:

1. Where elbows are required to transition from horizontal to vertical, use rigid steel conduit sweep elbows. At intersection with grade, wrap conduit with minimum two layers of black pipe tape.

C. Circuits operating above 600V: Rigid steel conduit

D. MC cable: For lighting fixture whips only

E. Minimum Raceway Size: 3/4” inch trade size

F. Raceway Fittings: Compatible with raceways and suitable for use and location.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 26 Section, Hangars and Supports.
- D. Conduit shall be supported independently from ceilings and shall not be supported on hangers with any other services (e.g. pipes, ductwork, or other mechanical systems).
- E. Install temporary closures to prevent foreign matter from entering raceways.
- F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
- G. Make bends and offsets so the inside diameter is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.

- H. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.
 - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- I. Join raceways with fittings designed and approved for that purpose and make joints tight.
 - 1. Use insulating bushings to protect conductors.
- J. Terminations:
 - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- K. Flexible Connections: Use maximum of 18" of LFMC flexible conduit for motors and equipment subject to vibration, noise transmission, or movement, and 72" for lighting fixture whips and wiring devices. Install separate ground conductor across flexible connections.
- L. Wall/Floor Penetrations: Conduits penetrating concrete floor slab or masonry walls shall have the annular space sealed with a UL approved minimum two (2) hour fire rated fire stopping assembly or material. Submit type and method for approval prior to installation.
- M. Paint all medium voltage conduits, pull and junction boxes red and identify with voltage label.

3.3 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 260533

SECTION 260553 – IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Identification labels for equipment installed under this contract.
 - 2. Identification for conductors

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents.

PART 2 - PRODUCTS

- 2.1 Adhesive Marking Labels for Raceway: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service shall be used for identifying all exposed conduits.

- A. Label Size: As follows:
 - 1. Raceways 1-inch and Smaller: 1-1/8 inches high by 4 inches long.
 - 2. Raceways Larger than 1-inch: 1-1/8 inches high by 8 inches long.
- B. Color: Black legend on orange background.

- 2.2 Wire/Cable Designation Tape Markers: all splice or pull boxes, panelboards, switchboards, switchgear or other connected equipment, identify all branch circuit power and all control cables and conductors using vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letters. Such identification shall include circuit/circuit breaker number, wire number (where applicable) gauge of conductor and either destination (at source locations) or source (at destination and intermediate locations).

- 2.3 Plasticized Card Stock Tags: For medium voltage and 480 volt feeder cables, provide phenolic or laminated plastic tags with machine printed legend to suit the application. Provide black legend on white background, except as otherwise indicated on project documents, and eyelet for fastening. Tags shall identify circuit/circuit breaker number, conductor gauge, and destination (at source location) or source (at destination and intermediate locations).
- 2.4 Nameplates: Engraved three-layer laminated plastic, black letters on white background. Printed plastic tape labels shall be permitted for use in identifying internal components in electrical enclosures, and for panelboard branch circuit identification, only. Embossed, anodized metal nameplates supplied by manufacturers for switchgear, transformers, etc., for equipment ratings are acceptable, but these do not circumvent the need for additional nameplates bearing the project equipment identification.
- 2.5 Provide nameplates with equipment name and drawing schedule identification for all electrical equipment including panelboards, cabinets, switchgear, switchboards, starters, and fire alarm devices. Devices serving a dedicated load shall be identified in a similar manner. Identify the incoming breakers or switches on high voltage switchgear and fused switch lineups with the utility or TCNJ substation source circuit identification number and location. A schedule or drawing shall identify proposed nameplates and verbiage, which shall be approved by the TCNJ Engineering Department.
- 2.6 Fasteners for Plastic Laminate and Metal nameplates: Provide self-tapping stainless steel screws or No. 10/32 minimum stainless steel machine screws with nuts, and flat and lock washers. Glue-on or self-adhesive nameplates are not permitted.
- 2.7 Cable Ties: Provide fungus-inert, self-extinguishing, one piece, self-locking nylon cable ties 0.18 inch minimum width. Fifty (50) pounds minimum tensile strength and suitable for a temperature range from -50 degrees F. to plus 350 degrees F.
- 2.8 Underground Warning Tape: Provide 4 inch wide plastic tape, detectable type, colored red with suitable warning legend (located 12 inches below grade) above all underground conduits and ductbanks.
- 2.9 All receptacle cover plates, including laboratory multi-outlet raceway receptacles, shall be identified as to panel and circuit number; this information shall be identified by means of a printed self-adhesive label. Label shall be translucent or clear polyester with black lettering, waterproof, and scratchproof.
- 2.10 Control wiring shall be identified and tagged at all terminals to correspond with wire numbers or other identifications as shown on Vendor's drawings.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape and write-on tags. Identify each ungrounded conductor according to source and circuit number.
- B. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual.
 - 1. Labeling Instructions:
 - a. Equipment: Engraved, laminated acrylic. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where 2 lines of text are required, use labels 2 inches high. Secure to equipment with four screws.
 - 2. Equipment to Be Labeled:
 - a. Switchboards
 - b. Disconnect switches
 - c. Control panels
 - d. Miscellaneous enclosures

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Color-Coding for Phase and Ground Identification:
 - 1. 120/240V, 1 Phase: Black, Red, White, Green
 - 2. 120/208V, 3 Phase: Black, Red, Blue, White, and Green
 - 3. 277/480V, 3 Phase: Brown, Orange, Yellow, Gray. This also applies to 277V lighting branch circuits (apply color code to maintain phase identity)
 - 4. Isolated Ground Conductors: Green with yellow tracer(s)
 - 5. Medium Voltage, 3 Phase: Identify each phase with the letters A, B and C
- D. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

- E. Conduits and pullboxes containing circuits 600 Volts and above shall be painted red. Install voltage labels on conduit at 10' intervals.

END OF SECTION 260553