TCNJ
THE COLLEGE OF NEW JERSEY

Number: AB230014
Date Issued: February 16, 2023
Purchasing Contact: Lauren Manning
Phone: (609) 771-2894
Email: manningl@tcnj.edu
Requesting Department: Facilities
Fiscal Year: 2023

Proposals will be due on **Tuesday, March 14, 2023 at 2 p.m.**

Important: This proposal must be received at or before the opening time and date stated above. Late proposals will not be accepted. Return proposal to:

The College of New Jersey
Office of Finance & Business Services, Purchasing Dept.
Administrative Services Building, Room 201
2000 Pennington Road
Ewing, New Jersey 08628-0718

PURPOSE AND INTENT OF REQUEST FOR PROPOSAL:

Solicit proposals for a firm to provide engineering design services for the Campus Underground Steam District Replacement.

PRE-BID CONFERENCE / ON-SITE INSPECTION IS SCHEDULE FOR FEBRUARY 23, 2023 AT 10:00 A.M. IN THE FACILITIES BUILDING, CONFERENCE ROOM 127A.

INSTRUCTIONS TO VENDOR'S FOR COMPLETING THIS PROPOSAL

1. Read the entire proposal, including all terms and conditions and specifications.
2. All prices must be typed or written in ink. Any corrections, erasures or other forms of alteration to unit and/or total prices must be initialed by the vendor.
3. **THIS PROPOSAL IS TO BE SIGNED BELOW (LINE 18).**
4. Proposal prices shall include delivery of all items F.O.B. destination or as otherwise provided.
5. Address all inquiries and correspondence to the buyer at the email, phone or address shown above.
6. All communication during the bidding process shall be directed to the Purchasing department only.
7. All instructions must be followed and signatures must be provided for proposal to be accepted.

MANDATORY TO BE COMPLETED BY THE VENDOR

8. Payment discount terms:_____
9. Prices quoted are firm through the following date:_____
10. Your Federal I.D. Number (FEIN):_____
11. Company Name:_____
12. Vendor telephone number:_____
13. Print Name:_____
14. Email Address:_____
15. Title:_____
16. Date:_____

17. ORIGINAL SIGNATURE OF VENDOR (MUST BE SIGNED)

Signature of the vendor attests that the vendor has read, understands, and agrees to all terms, conditions, and specifications set forth in the request for proposal unless otherwise stated in writing and submitted with the proposal.

X_____

AB230014

February 16, 2023

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

To be published on **February 16, 2023**. Contact person regarding placement of ad is Lauren Manning (609) 771-2894.

ADVERTISEMENT FOR BIDS

Under the provisions of the State College Contracts Law, Chapter 64 of Title 18-A, The College of New Jersey is soliciting proposals for a firm to Campus Underground Steam District Replacement Engineering Design Services **(AB230014).**

The College will accept sealed bids until **2:00 p.m., March 14, 2023** at the Office of Finance & Business Services, The College of New Jersey, 2000 Pennington Road, Administrative Services Building, Room 201, Ewing, NJ 08628-0718, at which time the proposals will be publicly opened and read. Copies of the bid documents may be obtained via our website **((https://bids.tcnj.edu/home/goods-and-services/)**

Bidders are encouraged to attend the pre-bid conference/on-site inspection on February 23, 2023 at 10:00 a.m. at the College's Facilities Building, Conference Room 127A.

BIDDERS REQUIRED TO COMPLY WITH THE REQUIREMENTS OF P.L. 1975 (N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27)

Required Procurement Documents & Bidder's Checklist

This bid proposal MUST be received by The College of New Jersey, Purchasing Department before or at 2:00 p.m. on Tuesday, March 14, 2023 at which time responses will be publicly opened and read. Any proposal arriving at the Purchasing Department after the submission due date and time will not be accepted.

The following Bidder's Checklist is provided as an aid to the bidder. It does not in any way relieve the bidder of its responsibility to ensure that its bid proposal is complete. It is the bidder's responsibility to ensure documents are submitted and that all requirements of the bid solicitation have been met.

Procurement Documentation & Bidder's Checklist		
FORMS, REGISTRATIONS, AND CERTIFICATIONS THAT MUST BE SUBMITTED BY THE BIDDER AT THE TIME OF SUBMISSION. FAILURE TO INCLUDE THE BELOW REQUESTED DOCUMENTATION MAY RESULT IN REJECTION OF BIDDER'S SUBMISSION.		
Required		**Vendor's Initials next to each item submitted with proposal**
X	Bidder Information and Signature Page	
X	Proposal Page/Pricing Sheet	
X	Acknowledgement of Receipt of Addenda (if any issued)	
X	Acknowledgement of Mandatory Equal Employment Opportunity Language (N.J.S.A. 10:5-31 et seq., N.J.A.C. 17:27)	
X	Completed Statement of Ownership Disclosure (N.J.S.A. 52:25-24.2)	
X	Completed Non-Collusion Affidavit	
X	Completed Source Disclosure Form (N.J.S.A. 52:34-13.2)	
X	Completed Disclosure of Investment Activities in Iran (N.J.S.A. 52:32-58)	
X	Completed Certification of Non-Involvement in Prohibited Activities in Russia (P.L.2022, c.3)	
X	Completed Vendor Qualification Sheet	
X	Bidder's policies, procedures and practices aimed at increasing diversity in the workforce	
	Enclosed Certified Check or Bid Bond for ten percent (10%) of the amount of the bid	
	Public Works Contractor Registration Certificate (A completed copy of your Certification form is not required at time of bid; however, the certificate must be valid at the time of bid.)	
	License and any other licenses, certifications, and qualifications.	
FORMS, REGISTRATIONS, AND CERTIFICATIONS THAT MUST BE SUBMITTED BY THE BIDDER PRIOR TO AWARD.		
X	Completed Two-year Chapter 51/Executive Order 117 Vendor Certification and Disclosure of Political Contributions	
X	Proof of Affirmative Action Compliance (N.J.S.A. 10:5-31 et seq., N.J.A.C. 17:27)	
X	New Jersey Business Registration Certificate (N.J.S.A. 52:32-44)	
X	Taxpayer Identification Request (W-9 Form)	
X	Certificate of Insurance	

The College of New Jersey
The Office of Finance & Business Services, Department of Purchasing
Administrative Services Building, Room 201
2000 Pennington Road
Ewing, New Jersey 08628-0718

1) *PURPOSE AND INTENT:*

a) The purpose of this Request for Proposal (RFP) is to secure a firm to provide engineering design services for the Campus Underground Steam District Replacement.
b) The College will award the contract within sixty (60) days from the date of the proposal opening. The College, pursuant to State College Contract Law, reserves the right to reject all proposals. In the event that proposals are rejected, the College may elect to re-bid this contract.
c) The College retains the right to award contracts to two or more vendors in accordance with law.
d) The College retains the rights to waive minor informalities or non-material exceptions in a bid in accordance with applicable laws.

2) *DEFINITIONS:*

a) **Addendum** – Written clarification or revision to this RFP issued by The College of New Jersey Purchasing Department.
b) **Vendor** – An individual or business entity submitting a bid proposal in response to this RFP.
c) **The College** or **College** or **TCNJ** – The College of New Jersey
d) **Contract** – This RFP, any addendum to this RFP, and the vendor's proposal submitted in response to this RFP, as accepted by the institution.
e) **Contractor** – The vendor's awarded a contract resulting from this RFP.
f) **The Institution(s) –** Any of higher education institution within the State of New Jersey.
g) **May** – Denotes that which is permissible but not mandatory.
h) **Shall** or **Must** – Denotes that which is a mandatory requirement. Failure to meet a mandatory requirement may result in the rejection of a bid proposal as materially non-responsive.
i) **Should** – Denotes that which is recommended but not mandatory.
j) **State** – State of New Jersey
k) **Bid –** Response submitted by vendor's in response to a publicly issued solicitation.
l) **RFP or Request for Proposal –** Document outlining a scope of work, specifications, etc. inviting potential vendors to submit a proposal to provide such products and/or services.

3) *PROPOSAL/BID PREPARATION AND SUBMISSION:*

Questions

All questions must be submitted in writing via email (manningl@tcnj.edu) to Lauren Manning, Finance & Business Services, The College of New Jersey, no later than **February 27, 2023 by 4 p.m.** Should any questions be received, an addendum will be placed in the newspaper and the addendum will be posted on the Office of Finance & Business Services website (www.tcnj.edu/~budfin/) no later than **March 3, 2023. Any and all such addenda MUST be attached to each vendor's proposal submission.**

Pre-bid Meeting and Site Inspection

The College may require that interested bidders attend a pre-bid meeting and or a site inspection. The purpose of this meeting or inspection is to provide the interested bidder the opportunity to present questions and see the institution's facilities where the services are to be performed. The institutions may require mandatory attendance at the meeting or inspection as a pre-requisite for submitting a proposal. The institutions may not accept a proposal from a bidder that failed to attend a mandatory pre-bid meeting or a mandatory site inspection.

Oral presentation
Prior to award of contract, vendor's who submit a proposal in response to this RFP may be required to give an oral presentation of their proposal if the College so desires. This may provide an opportunity for the vendor to clarify or elaborate on the proposal. The College will schedule the time and location of these presentations.

Submission
Each vendor submitting a proposal will deliver or cause to be delivered the required elements of the proposal package, sealed in an envelope and clearly marked as a proposal with its bid number affixed thereto, to:

THE COLLEGE OF NEW JERSEY
The Office of Finance & Business Services, Department of Purchasing
Administrative Services Building, Room 201
2000 Pennington Road
Ewing, New Jersey 08628-0718

Bid Opening: Tuesday, March 14, 2023 at 2:00 p.m.

Vendor's should submit one (1) hard copy of their proposal and one (1) digital copy (flash drive) of their proposal.

Signature
The cover page of the RFP, with lines 8 through 18 completed**, and must be signed by an authorized officer** of the bidding vendor and returned with the proposal. Failure to comply with this requirement or failure to provide all requested data, price schedules, signatures, etc. will result in rejection of the proposal.

Addenda
All addenda to this RFP will become part of the RFP and part of any contract awarded as a result of this RFP.

Cost Liability
The College assumes no responsibility and bears no liability for costs incurred by a vendor in the preparation and submittal of a bid proposal in response to this RFP.

Contents of Bid Proposal
Subsequent to bid opening, all information submitted by vendor's is response to the RFP is considered public information, except as may be exempted from public disclosure by the Open Public Records Act, N.J.S.A. 47:1A-1 et seq., and common law.

A vendor may designate specific information as not subject to disclosure when the vendor has a good faith legal/factual basis for such assertion. The institutions reserve the right to make the determination and will advise the vendor's accordingly. The location in the bid proposal of any such designation should be clearly stated in a cover letter. The institutions will not honor any attempt by a vendor either to designate its entire bid proposal as proprietary and/or to claim copyright protection for its entire proposal.

By signing this RFP response, the vendor waives any claims of copyright protection set forth within the manufacturer's price list and/or catalogs. The price lists and/or catalogs must be accessible to the institutions and cooperative purchasing partners and thus have to be made public to allow eligible purchasing entities access to the pricing information.

All bid proposals, with the exception of information determined by the institutions or the Court to be proprietary, are available for public inspection after the Letter of Intent to Award is issued. At such time, interested parties can contact The College of New Jersey Purchasing Department to inspect bid proposals received in response to this RFP.

Pricing
All pricing should be provided per the scope of work/attached cost sheet.

Energy Star energy efficient products: On April 22, 2006, Governor Jon Corzine signed Executive Order #11 stating that The New Jersey State government should assume a leadership role in promoting the efficient use of energy and natural resources in the interest of long-term protection and enhancement of our State's natural beauty. To meet this requirement, vendor's, including designs by architects and engineers, shall provide pricing for Energy Star energy efficient products when applicable. For products that do not have ENERGY STAR labels, vendors shall follow guidelines established by the New Jersey Clean Energy Program and/or requirements set forth in Executive Order #11.

Substitutions
The vendor's may include in their bid substitute materials or equipment or methods in lieu of those specified in the bidding documents. Any substitution must be equal in type, function and quality to the item required in the specifications.

No vendor is 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. Vendor's must determine for themselves which to offer. This may be cause for automatic rejection of bid.

Multiple Proposals are Not Allowed
No vendor's is allowed to submit more than one bid from an individual, vendor, partnership, corporation or association under the same or different name. This may be cause for automatic rejection of each bid.

Bid Withdrawal
A vendor may request that its bid be withdrawn prior to bid opening. Such request must be made in writing to The College Executive Director of Procurement Services. If the request is granted, the vendor may submit a revised bid as long as the bid is received prior to the announced date and time for bid opening and at the place designated. Once bids have been opened, the vendor's runs the risk of forfeiting their bid bond.

Submitted proposals shall be valid for at least a period of (60) days to allow for sufficient time for bid evaluation and contract award.

Source Disclosure Certification
For all procurements that are "primarily" for services, the vendor must comply with N.J.S.A 52:34-13.2 (also known as Executive Order 129) and file a source disclosure certification with the agency. It is the agency's responsibility to determine if the vendor complies with N.J.S.A. 52:34-13.2. In order to be in compliance, all services provided to the College, must be performed within the United States.

Diversity in the Workforce
The College of New Jersey strives to create a diverse environment through a variety of initiatives to make the campus more welcoming to people of all backgrounds. Submit a summary of your organization's policies, procedures and practices aimed at increasing diversity in the workforce. Specify the types of diversity that are important to your organization and the diversity of your workforce. Specify the diversity in the team you select for the College commitment and how that will affect the quality of services provided to the College.

P.L. 2005, Chapter 51 / Executive Order 117 - Vendor Certification and Disclosure of Political Contributions
In order for your proposal to be accepted and deemed valid, your company/vendor 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 RFP cannot be awarded without approval of the Certification and Disclosure forms by the State of New Jersey, Department of Treasury.

Business Registration
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 vendor/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 vendor's, 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.

Affirmative Action

The vendor is required to submit a copy of Certificate of Employee Information Report or a copy of Federal Letter of Approval verifying that the vendor is operating under a federally approved or sanctioned Affirmative Action program. If the vendor has neither document of Affirmative Action evidence, then the vendor must complete the attached Affirmative Action Employee Information Report (AA-302) and send it along with a check for $150 to the NJ Department of Treasury, Division of Purchase and Property, Contract Compliance Unit. Send a copy of the completed form and check to the College.

Certificate of Insurance

The vendor is required to submit proof of liability insurance in accordance with The College's Terms and Conditions. See attachment titled Terms and Conditions.

License

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

4) ***SPECIAL CONTRACTUAL TERMS AND CONDITIONS:***

a) Contract administration: The vendor will coordinate all work schedules with Facilities once the contract is awarded.
b) Term of contract as specified in the scope of work shall commence with the formal date of award and shall not exceed thirty-six (36) months.
c) Proposals will include shipping F.O.B. Destination.
d) The College obligation hereunder is contingent upon the availability of appropriated funds from which payment for contract purposes can be made.
e) The vendor must comply with the delivery date as specified in the contract. Failure to comply may result in the termination of the contract.

f) All deliveries will be made during regular working hours, 8:30 a.m. to 4:30 p.m. Monday through Friday. Changes thereto must be granted with written approval by the College.
g) The vendor will be responsible for the delivery of products in first-class condition at the point of delivery and in accordance with good commercial practices.
h) Order of Precedence: The contract awarded as a result of this RFP shall consist of this RFP, addenda to this RFP, the vendors bid proposal and the Notice of Award. Unless specifically stated in this RFP, the Special Contractual Terms and Conditions of the RFP and addenda take precedence over the College's Standard Terms and Conditions.
i) CONTRACT TRANSITION: In the event that a new contract has not been awarded prior to the contract expiration date, as may be extended herein, it shall be incumbent upon the vendor to continue the contract under the same terms and conditions until a new contract can be completely operational. At no time shall this transition period extend more than ninety (90) days beyond the expiration of the contract
j) If awarded a contract your company/vendor will be required to comply with the requirements of P.L. 1975 c.127. (NJAC 17:27).
k) 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.

5) *PROPOSAL EVALUATION:*

Evaluation committee - Bid proposals may be evaluated by a committee composed of members of the institution Unit/Department responsible for managing the service, the institution's Purchasing Department and other institution employees.

Proposals will be judged by the following criteria:
a) Experience of the vendor in the commodity being bid.
b) The ability of the vendor to efficiently, accurately, and successfully perform the required services essential to this contract. The vendor's performance history with regards to these services will be used in the evaluating whether or not to award the contract to that vendor.
c) A vendor's response to all specification requirements in sufficient detail for the evaluator(s) to analyze the proposal and make sound judgments about it.
d) Vendor's diversity in team and subcontractors (if any) selected for this project.
e) Price. The College of New Jersey reserves the right to evaluate price(s) and award contracts, based on the present worth analysis when it is determined to be most advantageous to the College. Vendor's should submit prices exactly as instructed. The College reserves the right to request all vendors to explain the method used to arrive at any or all prices. The College reserves the right to require vendors to provide a schedule of values of their bid price upon request. If it is discovered that there is an arithmetic disparity between the unit price and the total extended price, the unit price shall prevail. If there is any other ambiguity in the pricing other than a disparity between unit price and extended price and the vendor's intention is not readily discernible from other parts of the bid proposal, the Executive Director of Procurement Services may seek clarification from the vendors to ascertain the true intent of the bid.

6) *BEST AND FINAL OFFER (BAFO):*

The College of New Jersey reserves the right, at any time prior to the award of a Contract and for any reason, to request and consider "best and final" proposals from one or more of the vendor's who have submitted a proposal. The number of vendor's allowed to submit "best and finals" and the scope of the "best and finals" shall be determined solely by The College of New Jersey. No vendor has a right to submit a "best and final."

Campus Underground Steam District Replacement Engineering Design Services

Request for Proposal

Date Issued: February 16, 2023

Due Date: March 14, 2023

INDEX

1. INTRODUCTION

The College of New Jersey is located on 289 tree-lined acres in suburban Ewing, New Jersey. Ewing is approximately 5 miles from Trenton, the State Capital, and 60 minutes from Philadelphia and New York. The College is primarily an undergraduate and residential college with targeted graduate programs. Its diverse community of learners is dedicated to free inquiry and open exchange, to excellence in teaching, creativity, scholarship, and citizenship, and to the transformative power of education in a highly competitive institution.

In keeping with its most basic goal (to support the mission-based planning effort to meet the academic aspirations of the College), the College's facilities master plan has been guided by six goals, one of which is to reduce the effective age and increase the remaining useful life expectancy of the academic and residential facilities. Increasing the useful life expectancy of facilities requires replacing systems as they approach the end of their expected life cycle, as well as identifying and addressing issues during a system's life cycle.

This project will be to complete an audit and assessment of the existing Campus Steam District, develop a replacement program for 10 to 15-year implementation, create specifications/construction standards and design services for the first phase of the district steam piping replacement program scheduled for the summer of 2024. It is anticipated the College will engage the selected consultant throughout the 10 to 15 years cycle of the replacement program.

The College believes that a collaborative approach is essential to a successful project. The Consultant will have one Project Manager point of contact at the College, but will interact with several representatives from the campus community. These representatives include Campus Planning, Maintenance, Energy and Sustainability, EHS, Building Services and others as needed.

A Proposal Conference will be held on February 23, 2023 from 10 am to 11 am in the Facilities Maintenance Building Conference Room 127A. Attendance is not mandatory but strongly recommended. Addendum will be distributed to all firms that receive the RFP that will include the Minutes of the meeting and questions received from all firms.

2. GENERAL SCOPE OF WORK

a. Background:

The Central Utility Plant (CUP) underground steam and condensate district was built in the 1970's and needs a planned approach to replace most of the existing systems. TCNJ is seeking a long-term engineering design collaborator to replace the campus underground steam and condensate infrastructure system over a period of 10 to 15 years. This engineering services RFP is being issued for the following scope of work

- Investigate and assess the existing CUP steam generating equipment, underground piping district (steam, condensate and high-pressure drip), manholes and building mechanical room steam equipment. Provide an audit report of the findings and issue recommendations prioritizing improving performance of the system to increase reliability and reducing energy consumption

- Partner with the College to craft a long-term vision for holistically improving/replacing the operating system components. Engineer will create operational logistics plans and retro commissioning programs leading to a recommendation of priorities for implementation
- Review all existing documentation (drawings, specifications, reports, studies, equipment spec sheets, as builts, etc.) associated with the steam system provided by TCNJ
- When this RFP refers to "Steam" the phrase includes high pressure steam, pumped condensate and high-pressure drip from the CUP through the piping district to each of the high-pressure relief valves in each building as part of the scope of work

The system consists of the following components:

CUP

- One 5.2 MW Solar Turbine Taurus 60 dual fuel natural gas and #2 oil, and Ideal electricity generator, and turbine inlet cooling
- One ERI heat recovery steam generator HRSG, 28,000 PPH unfired, 42,000 PPH fired
- Two Gardner Denver natural gas reciprocating compressors with lead/lag controls
- One Cleaver Brooks high pressure steam boiler, dual fuel natural gas and #2 oil, 40,000 PPH
- One Superior high-pressure steam boiler, dual fuel natural gas and #2 oil, 40,000 PPH

Steam District

- Approximately 11,000 linear feet (each) of steam, condensate and high pressure drip underground piping throughout campus in various conditions
- Campus steam map (Appendix C)
- 28 manholes in various stages of failure (water infiltration, structural and mechanical piping/components)
- 29 building piping entry points of steam, condensate and high-pressure drip
- Underground steam piping district condition matrix which contains point to point routing data, pipe size, linear footage, year constructed and pipe condition. This matrix is for informational purposes only and must be field verified by the selected engineer (Appendix D)

b. Scope of Work in Detail

The selected consultant will be required to complete the work outlined below

Phase 1

1. Survey and inspect the following steam manholes to determine extent of water infiltration, structural integrity and condition of existing link seals/sleeves. Manhole inspections will also include surveying the conditions of the steam/condensate components (piping, fittings, traps, equipment, pipe hangers and insulation. All documentation shall be provided in a format deemed suitable for by the College for inclusion in the campus GIS (Geographical Information System) database. TCNJ will pump out the manholes as required so the designer will have clear access to inspect the entire interior of manholes.

MANHOLES
1) MH-2
2) MH-3
3) MH-4
4) MH-4A
5) MH-SC
6) MH-4B
7) MH-STEM
8) MH-5
9) MH-7
10) MH-8
11) MH-11
12) MH-12
13) MH-13
14) MH-13B
15) MH-13C
16) MH-13D
17) MH-14
18) MH-14A
19) MH-14C
20) MH-14D
21) MH-15
22) MH-17
23) MH-17A
24) MH-19
25) MH-20
26) MH-21
27) MH-21A
28) MH-22

2. Survey and inspect the following building mechanical spaces to determine extent of steam trap, piping, equipment, link seals, hangers and insulation repairs/replacement required to bring steam and condensate system up to functional operation standards. TCNJ is in the process of installing barcode service tags to all serviceable steam system components within buildings. The engineer will assist in this effort by installing tags during their survey audit on components not currently tagged.

BUILDINGS
1) Norsworthy
2) EAB
3) Centennial
4) Education
5) Roscoe West
6) Forcina
7) STEM
8) Library
9) Green
10) Biology
11) Physics/Chemistry
12) Armstrong
13) Kendall
14) Bliss
15) Bliss Annex
16) Business Building
17) Social Sciences
18) Student Center
19) Music
20) AIMM
21) Trenton
22) Packer
23) Eickhoff
24) New Res
25) Decker
26) Cromwell
27) Travers
28) Wolfe
29) Rec Center

PC (Low Pressure Pumped Condensate) – enters CUP condensate collection tanks. All building and manhole information was retrieved from 11/17/11 Entech drawing

3. Design firm must provide proof that their representatives have Confined Space training before TCNJ will permit entrance into any associated spaces (manholes, crawlspaces, etc.). Steam system will be shut down for two weeks in from May 20th to June 3rd 2023 for the Designer to gain access to the manholes

4. Designer will document the entire steam and condensate system including manholes, CUP and building mechanical room service entrances to the high-pressure relief valve in order to generate an updated campus as built plan.
5. Designer shall review the performance and intent of design for the ***entire existing steam/condensate system*** (steam generating equipment, pumping, trapping, pipe sizing, flow rates, etc.) to ensure the original system and subsequent modifications through the years are adequate to service the University's current needs. The Engineer shall develop as part of this project a "living" master Steam and Condensate Hydraulic Model program, ***which the College will own***, to show the existing system performance constraints and can be remodeled once future buildings/systems parameters change. Located in Appendix G is a Campus Cogeneration and Campus System Review Report (Smith Engineering) from 2019 which can serve as reference materials for the model
6. Designer will interface as required with manufacturer representatives for the steam and condensate equipment to gather information on the existing system
7. Designer will provide a new updated campus steam system map and P&ID drawings for the steam and condensate system consistent with the TCNJ GIS system
8. Provide complete design services (programmatic, SD/DD/CD, permit drawings and CA services) for the following:

Intermediate work to maintain the system until the entire campus steam district is replaced or retired. This work will need to be phased over a period of a few years due to logistics of shutting down the steam system for extended periods of time

a. Replacement/repairs of all interior manhole piping components including insulation, hangers, traps, condensate pumps, etc. Work will also include:
    i. Installation of extra high temperature pump and associated discharge piping to sanitary system below grade to address standing water
    ii. Installation electrical receptacle and explosion proof work light for routine servicing
    iii. Replacing link seals as required
    iv. Replacement or installation of manhole entry ladder as required/possible
b. Upgrading/replacing steam system components at building mechanical room entry points to the pressure relief valve to service building systems
c. Replacement of the existing condensate return flash tank and two steam pressure driven condensate return pumps

d. Evaluating existing steam generating equipment in the CUP and provide recommendations for repairs/replacement for long and short planning. Consultants will carry a $50k allowance in their bids to address design services associated with whatever recommendations are accepted by the College

Phase 2

1. Provide specified design services for replacing the existing steam/condensate lines and manholes as outlined below. Scope also includes piping junction connections at manholes for steam and condensate lines we are not replacing
    - Manhole #4 to Manhole #5
    - Manhole #5 to Manhole #11
    - Manhole #11 to Green Hall
    - Manhole #11 to Library
    - Manhole #13D to Packer Hall
    - Manhole #13D to Eickhoff Hall

    Work will be scheduled for installation in the summer of 2024 (May 20th to August 11th) with consultant permit and construction drawings ready for bid issuance/DCA submission on November 1st 2023.

    Estimated project cost including soft costs for Phase 2 scope of work is $2.5 million

Any structural and/or civil engineering services required for this effort will be under this Consultants contract.

2. **Mechanical and Structural Engineering Scope**

    a. Review the College's documentation and field survey the existing mechanical conditions inside existing buildings and manholes as required to design the project. Note that access

into manholes as required for survey activities will require confined space certification. The prospective bidder will be responsible to provide the tripod, harness and OSHA compliant gas monitor.

b. Provide mechanical demolition plans and details for work inside buildings and manholes. Demolition drawings shall include portions of the piping system to be removed to accommodate the new installation.
c. The Engineer shall develop an asbestos removal plan/drawings if any of the existing piping or other project components requiring abatement. The Engineer will work with Environmental Health and Safety to review relevant documentation to determine what procedures will be implemented for the work. College will procure the services for Environmental Consultant but the site contractor will be responsible for removal of the abated piping (and other components) the College designated location.
d. Provide mechanical piping plans inside manholes and buildings.
e. Provide mechanical piping sections and details inside manholes and buildings.
f. Reroute or perform any necessary modification to the existing utilities to install the steam and condensate piping.
g. Provide manhole mechanical and structural drawings required to install new steam manholes.
h. Perform structural engineering calculations.
i. Provide structural demolition plans if required.
j. Provide mechanical and structural specifications and include in the specification cleaning and flushing procedures.
k. Provide secondary steam insulation jacket air testing specifications. This consultant must verify with the contractor all insulation is 100% dry before any backfilling or pipe enclosure activities are approved to proceed
l. All underground piping weld joints will be 100% x-rayed consistent with ASME B31.1 (Power Piping standards and recommendations 2022 edition)
m. Engineer shall include requirements in the specifications that welder certification paperwork must be submitted and approved by the Engineer before the contractor can begin work onsite
n. The Engineer will develop design details showing all trenches are required to have a stone base and during installation all piping will be elevated on sandbags or another approved method consistent with manufacturers recommendations. Piping will not be permitted to sit in standing water in order to protect the integrity of the insulation jacket during construction. The Engineer will develop a trench dewatering plan which the contractor will be required to follow. All exposed underground piping ends will be wrapped and protected at all times unless work is being executed.
o. All underground piping will be encased in flowable fill to a 12” diameter entirely around the pipes
p. Replacing existing manhole structures with new precast manhole structures including DOT rated lids and rings. Manhole penetrations will need to be cored in the field and design documents will reflect these criteria. All link seals will be dual high temperature corrosion resistant type and installed into corrosion resistant steel sleeves that are appropriately set

for the manhole penetrations. The new precast structures and link seals w/sleeve installations require zero "0" leakage from rain and/or groundwater. Manhole lids and rings shall be manufactured by Fiberlite with no exceptions. Manhole exteriors shall be weatherproofed with Sikabit S-60 or Tamko -60

q. All manholes will be designed so valves can be shut off by TCNJ staff without entering the manhole. All valve stems will be accessible via a manhole lid per the photo below

All manholes shall be provided with sump pits and covers, high temperature water pumps, electric service to both sump pump and convenience receptacle, and discharge piping to adjacent building with tempering devices or dedicated drywell before traveling to stormwater drainage.

r. All underground steam and condensate piping shall be welded schedule 80 for all new systems except for threaded trap and union connection points

s. Participate in project design review meetings at 60% and 100% design complete stages. Provide three sets of preliminary drawings for review each stage. Provide specification book for review at the 60% and 100% stages.

t. Provide structural demolition plans if required.

u. Provide mechanical and structural specifications and include in the specification cleaning and flushing procedures.

3. Site Survey & Engineering Scope

a. Contact 811 and coordinate with TCNJ for required utility stakeout of the subject area.

b. Prepare Topographic Survey of subject area. Provide topographic contours to 1' intervals and spot grades as necessary to establish existing site topography.

c. Prepare Survey of existing site improvements within limits of subject area to include the following:

   i. Top of Curb / Bottom of Curb

ii. Inverts / ID of existing utilities on site and in adjacent streets
iii. RIM + Invert elevations of exist storm and sanitary manholes
iv. Storm inlets and sanitary structures (in roadway and on site).
v. Valves, utility boxes, and associated above ground utility structures.
vi. Campus benchmark location
vii. Monuments, plaques, and signs.
viii. Locate Existing building corners and entrance/exits.
ix. Existing site stairs, landings, and sidewalks that are in proximity to the line of disturbance
x. Limits of existing asphalt, concrete, and decorative pavers.
xi. Light poles and utility poles.
xii. Trees – larger than 2" trunk diameter and limits of planter areas.
xiii. Fire Hydrants, emergency phones, campus signage.

d. Prepare a detailed utility as-built survey of all markouts/tracings and elevation detail. TCNJ will hire a 3rd party utility location company to complete this work (see below for more details)
e. Compile all new survey field data and prepare updated Existing Conditions Base Plan for use in preparing the communication routing design, existing grade profile, and bidding documents.
f. Existing Grade Profile: using topographic survey data, generate an existing grade profile along the centerline of proposed steam routing. Show elevation detail for crossing utilities.
g. Concept Routing Plan: in coordination with the College and Mechanical Engineer, and incorporating utility data, prepare a new steam routing layout for review and approval. Review potential utility conflicts and discuss with College the required utility installation depth.
h. Project Design Meetings: attend all required project design meetings with the Design Team and related College personnel during the design phase of this project.
i. Coordinate and provide Field Supervision/Review for Utility Location Consultant: acting on behalf of the College, provide field review and supervision services. Coordinate all scheduling of work and direct all Utility Location operations to ensure efficient and timely field work. Provide required coordination with the College. Utility Location verification services will be contracted by the College. However, the prospective bidder will be responsible to provide the scope of service to the Consultant and necessary coordination to ensure all utilities have been identified.
j. Construction Bid Documents (Plans, Details, and Specifications): incorporating the concept routing layout, prepare all required design and construction documents suitable for bidding and construction, to show site restoration (paving, curbing, walks) and proposed communication layout and utility profile. Indicate any required rerouting of affected utilities to accommodate the proposed new steam and condensate pipe. Communication Design will be coordinated with TCNJ IT department. Plans will include the following drawings:
    i. Existing Conditions Survey Base Plan

ii. Site Demolition Plan
iii. Campus Site Logistics Plan indicating locations of fenced in work area, contractor parking, emergency service vehicle access, FDC locations, spoils locations, etc.
iv. Erosion and Sediment Control Plans, Specifications, and Details
v. Steam Utility Plans
vi. Site Layout and Construction Plans
vii. Utility Profiles for steam & condensate piping
viii. Site Construction Details
ix. Written Technical Specifications

k. Construction Administrative Services: CA services are to be included in the designer scope proposed to adequately meet the needs of the project including punchlist, site surveys, weekly onsite construction meeting, interface with Geotech consultant, landscape contractor, etc.
l. The Engineer and their Consultants must include time in their design services bid for **a weekly 1-hour onsite construction meeting**. **These meeting hours are not to be allocated for punch list walkthroughs or other site visits.**

4. Mechanical and Civil Bidding & Construction Scope

a. Review material submittals and contractor shop drawings for compliance to design criteria. Coordinate civil and mechanical design with piping vendor Thermacor Process Inc, Fort Worth TX
b. Provide construction assistance to provide responses to requests for information and resolving field conflicts. Prepare construction sketches as required to resolve field issues.
c. Attend the bid meeting and issue meeting minutes and any necessary addendum.
d. Participate in weekly project meetings during construction. Assume (16) meetings to be attended by the mechanical and civil contractor.
e. Answer Contractor RFIs.
f. Provide miscellaneous services requested by Owner during the construction phase.
g. Contractor QA/QC oversight during onsite construction activities
    i. No backfilling, concrete work or weld joint insulation/jacket enclosure work will be permitted until this consultant signs off on weld test radiography reports, insulation/jacket are dry and no water or moisture is present
    ii. Coordinating and overseeing site interface with the manufacturer of the steam and condensate piping to ensure all design parameters are being followed with expansion loops, link seals/sleeves at piping entries points for manholes and buildings, etc
    iii. Review Geotech reports and work with consultant to ensure design specs are being followed for concrete work, backfilling and site restoration
h. All spoils will be removed from the site and new fill will be used for backfilling
i. Precast manholes will be purchased by the College vendor of choice. Consultant will review all submittals and coordinate directly with vendor for developing specifications

5. **Landscape Design and Construction Scope**
    a. Design and develop a site restoration plan for landscape, hardscape, trees, signage, benches, etc. associated with the replacement of the underground steam and condensate piping project. This includes specifications, drawings, planting selections, material selections, etc.
    b. Consultant will develop site restoration/enhancement program under the direction of the TCNJ Campus Architect and Manager of Grounds Services
    c. Consultant will collaboratively meet as needed with numerous campus constituents during the design phase to get input for final design. This will include meeting with the Assistant Vice President for Accessibility Resources to ensure all pathways are ADA compliant and meet the needs of the campus community
    d. Designer will review all existing drawings, as builts, landscape master plan, topographical surveys to develop program
    e. Participate in weekly project meetings during the landscape restoration construction period.
    f. Answer Contractor RFIs.
    g. Provide miscellaneous services requested by Owner during construction phase
    h. College will bid the Landscape/Hardscape scope of work a separate contractor from the Site/Mechanical contactor. The Landscape contractor will work directly for the College
    i. Site contractor will bring the site back to rough grade and include installation of top soil as directed in site construction contract documents. Landscape contractor will be responsible for all site work from that point on in the schedule.
    j. Engineer is responsible to include the TCNJ Campus Landscape Design Standards in the project RFP documents and provide oversight for this scope of work in the project.
    k. Provide landscape contractor QA/QC oversight during onsite construction activities such as
        i. Inspecting trees and plantings upon arrival to the site prior to installation
        ii. Ensure watering and other maintenance activities are properly completed prior to turnover to College
        iii. Be onsite as required to inspect the quality of work and schedule progress of Landscape Site contractor
        iv. Return to campus prior to the end of the warranty period to inspect all plantings, hardscape, furniture, etc. to ensure all components are in good order. If components are not in compliance consultant will directly manage correspondence and contractor activities to facilitate corrective measures
        v. Consultant will go with Director of Grounds Services as needed to physically select large caliper trees/plantings at the nursery for installation on campus
        vi. Landscape design will adhere to TCNJ Campus Landscape Design standards which are enclosed in this RFP.

6. **Geotech Scope of Work Services Bid Package Document**
    a. Provide an RFP scope of work for Geotech bid package. Narrative will include the following services: trench backfilling, lab testing, weld inspections, flowable fill/cast in place concrete, engineering supervision and closeout reports.

7. **As Built Services Scope of Work**
    a. Field verify the piping inside buildings and manholes and correct plans to reflect "as built condition". Update site civil and mechanical drawings to reflect as built conditions based on "red line markups" provided by the contractor.
    b. Update the master site's steam and condensate piping diagram.

8. **Other**
    a. Reimbursable costs including parking, printing, reproduction, mileage, rental equipment such and tripod, OSHA gas monitor, harness, etc. shall be included in the proposal as a separate line item. Mark up of reimbursable costs are not permitted.
    b. TCNJ will directly outsource 3rd party work for radiography testing, geotech services and environmental consultants. This Engineer will oversee and coordinate the work activities of these two parties

The construction of this project will be publicly advertised and will be bid as a lump sum single prime contract. The Consultant will participate in the bid and award process. Once bid documents have been issued, the Consultant shall not have any contact with bidders. All questions from bidders must be submitted to the College.

3. REQUIRED SERVICES

The scope of services includes the design and administration of the construction of this project, including professional architectural and engineering services in connection with the Program Document, schematic design, the design development, the construction documents, the bidding and bid award, the administration of construction, and the post-construction phases. The A/E shall employ or engage the professional services of sub-consultants as may be needed for the performance of the services required by this project.

The consultant is responsible for investigation of the existing conditions, reviewing existing drawings, surveying the actual conditions and recommending the solutions. All work associated with this project is to be included in the fee.

Consultant shall review all contractor submittals and shop drawings for compliance with construction documents and contracts and communicate with the contractors and the project manager as needed.

New Jersey Uniform Construction Code (NJUCC) review, permitting, and construction inspections are through New Jersey's Department of Community Affairs (DCA). Other government agency reviews, permitting, and construction inspections, may include, but not be limited to, Department of Environmental Protection (DEP), Delaware Raritan Canal Commission (DRCC), Mercer County Soil Conservation District (MCSCD), and Ewing Lawrence Sewage Authority (ELSA). It is the College's intention to receive DCA and all other governmental agency review comments and incorporate them into the bid documents prior to issuing to prospective bidders.

The consultant will be responsible for submitting project documents to DCA and other governmental agencies for permitting and plan review. The DCA fees for plan review and permitting will be provided by TCNJ.

The College is insured through Factory Mutual (FM) and the design shall meet FM requirements. Design documents shall be submitted to FM at the end of the Design Development and the Construction Documents phases. FM review requirements and/or comments that require changes to the design and/or increase the budget should be identified and discussed with the College.

4. PROPOSAL REQUIREMENTS AND EVALUATION

Team, Organization and Consultants: Provide basic data relative to firm's size, history, personnel, special expertise, and general credits. Provide resumes of individuals who would be assigned to the project. Provide qualifications of all consultants. Provide an organizational chart with the names of key personnel who will be assigned to the project from your firm and all consultants. In accordance with the contract, substitution of team members requires the College's approval. In the event of a joint venture, partnership, or use of consultants, provide a brief outline of the responsibilities of each firm and list projects that both firms have worked on successfully together.

Experience with Underground District Steam and Condensate Piping Replacement Projects: Provide examples of successfully designed similar **projects** by your firm and/or the individuals that would be assigned to this project. (Experience with underground utility projects, Central Utility Plant operations, steam/condensate systems and site/landscape restoration)

Fee: The proposal submission shall include a fee for the required services and expenses. Please note that the contract requires expenses that may typically be considered reimbursable to be included in the fee. There will be no additional compensation for these expenses, except as noted in the contract. In addition to the fee, the proposal submission shall include a schedule of hourly rates to be used for additional services for each team member of the project. The hourly rates shall be the base salary as defined in the contract. The hourly rates shall be capped at a 3% increase each year.

Schedule: The proposal submission shall refer to the Milestone Schedule, which outlines anticipated tasks to be completed. The proposal shall identify any variance of time and/or tasks required to complete this work. The proposal may provide a schedule indicating tasks within each design phase.

Understanding of the Project: The proposal shall indicate the teams understanding of the project, project processes, planning methodology, and the College.

Other Pertinent Information: Provide other pertinent information as deemed necessary.

The evaluation of the proposal shall be based on the following criteria:

Criteria	Weighting
Team, Organization and Consultants	10%
Experience with Underground District Steam and Condensate Piping Replacement Projects	30%
Fee	40%

Criteria	Weighting
Schedule and Understanding of Project	20%
Total	**100 %**

Inquiries: Inquiries regarding this Request for Proposal shall be submitted in writing, and directed to:

Lauren Manning
Finance & Business Services
E-mail: manningl@tcnj.edu

The College will respond only to written inquiries. All responses will be issued in writing to all.

Proposal Submission: An electronic copy and a minimum of one (1) hard copy of the proposal must be submitted to the address below, no later than 2:00 P.M. on March 14, 2023:

The College of New Jersey
Finance & Business Services
Attn: Lauren Manning
manningl@tcnj.edu
ASB Room 201
2000 Pennington Road
Ewing, NJ 08628

Contract: Refer to the contract in **Appendix A** for an outline of the scope of work during each phase of the project. Please note that the contract lists the insurance requirements, as well as other documents that must be submitted after the consultant has been selected. The contract is included for your information, and is not to be filled out with the proposal submission. **ALL questions and concerns regarding the contract MUST be submitted by the last day for questions**. Work on this project will not commence until the signed contract has been returned to the College, all required paperwork has been submitted and approved, and a purchase order has been issued.

5. MILESTONE SCHEDULE

PROCUREMENT

Task	Start Date	Finish Date
Request for Proposal is issued	2/16/2023	
Proposal Conference	2/23/2023	
Last day for questions	2/27/2023	
Addendum issued, if needed	3/3/2023	
Proposals due to TCNJ at 2:00 PM	3/14/2023	
TCNJ reviews proposals	3/15/2023	3/21/2023
Consultant Selection	3/23/2023	

NOTICES:

- This RFP has been completed in good faith. The information contained within is selective and subject to the College's updating, expansion, revision and amendment
- TCNJ reserves the right to change any aspect of, terminate, or delay this RFP, the RFP process and/or program that is outlined within this RFP at any time, and notice shall be given in a timely manner.
- Responses to this RFP will become the property of the College and will form the basis of negotiations of an agreement between the College and the apparent successful MEP.
- The College is not liable and will not be responsible for any costs incurred by any MEP firm for the preparation and delivery of the RFP responses, nor will the College be liable for any costs incurred prior to the execution of an agreement
- Answers to all pertinent questions raised at the vendor conference will be answered in writing to all known participants.
- Any Information contained in the proposal that is proprietary must be clearly designated. Marking the entire proposal as proprietary will be neither accepted nor honored.
- All materials submitted to the request become the property of the College. Selection or rejection of a response does not affect this right.
- The College will not be liable for any errors in MEP firm's proposals. MEP Engineer will not be allowed to alter proposal documents after the deadline for proposal submission.
- The College will select the proposal that, in its sole discretion, is the most advantageous to the University. The College reserves the right to make an award without further discussion of the proposal submitted; there may be no best and final offer procedure. Therefore, the proposal should be initially submitted on the most favorable terms the MEP Engineer can offer.

Campus Underground Steam District
Replacement Engineering
Design Services

PRICING SCHEDULE

It is the intent of the College to engage the selected consultant for the duration of the underground steam replacement program. The contract will be awarded to one vendor. The total cost for each Phase, as outlined in the Scope of Work, shall be listed below.

Phase 1: Audit/Assessment of Central Utility Plant Equipment and Campus Steam District including creation of Campus Hydraulic Steam/Condensate Model

_____ $ _____
words dollars

Phase 2: 2024 Underground Piping Replacement project including design, permit drawings, construction administration

_____ $ _____
words dollars

ITEM OF WORK	Estimated Hours for only Phase 2, outlined in Scope of Work		
	Principal/Senior Engineer	Project Engineer	Clerical
Initial site visit and pre-design			
Field measurements, building survey			
Review existing AutoCAD drawings			
Submissions to TCNJ for review (SD/DD/CD)			
Permit Submission to DCA			
Submit Construction Documents for bid			
Provide bid clarifications/addenda			
Bid meetings (Prebid and Contractor Descope)			
Contract Admin Services including punch list (See Schedule requirements)			
As-built drawings			
Total Hours:			

PROFESSIONAL FEE SCHEDULE: (HOURLY RATES)

The schedule of hourly rates to be used for additional services for each team member of the project. The hourly rates shall be the base salary as defined in the contract. The hourly rates shall be capped at a 3% increase each year.

Principal **$ _____**

Senior Engineer **$ _____**

Project Engineer **$ _____**

Cad Operator **$ _____**

Clerical **$ _____**

Appendix A – Contract

The contract is included for information purposes, and shall not be included in the proposal. All questions and/or concerns regarding the contract must be addressed during the proposal stage. **Questions and/or concerns regarding the contract will NOT be considered after February 27, 2023, the last day for questions.**

ENGINEER PROFESSIONAL SERVICE CONTRACT

This AGREEMENT is entered into as of the _____ day of _____, _____, between

the College: The College of New Jersey
PO Box 7718
2000 Pennington Road
Ewing, New Jersey 08628-0718

and

the Engineer: _____
_____
_____

in connection with

the Project: Campus Underground Steam District Replacement Engineering Design Services

For full Scope of Work refer to the Request for Proposal, Proposal, and Addendum

ARTICLE 1
ENGINEER'S RESPONSIBILITIES

1.1 ENGINEER'S SERVICES. The College contracts with the Engineer and the Engineer agrees to perform the professional services specified in this Contract as well as the professional services specified in the request for proposal's scope of work ("RFP"), Engineer's proposal in response to the request for proposal that has been accepted by the College exclusive of qualifications and restrictions that have not been explicitly accepted by the College ("Proposal"), and Addendum and in the construction contract between the College and the contractor awarded the Project by the College ("Construction Contract") (the Construction Contract and all of its exhibits and the documents incorporated therein shall be referred to herein as the "Contract Documents") in connection with the design and administration of the construction of the Project identified above. The services include professional engineering services in connection with the Design Phase and the Bidding Phase, the Construction Phase, and the Post Construction Phase as set forth herein.

1.2 STANDARD OF CARE. The Engineer shall perform its services under this Contract in a good, skillful and prompt manner and in accordance with the standard of professional care and skill expected of engineers practicing in the geographic region in which the Project is located and experienced in the design and construction of projects similar in scope and size to the Project, and also in accordance with this Contract. The Engineer shall cause its subconsultants to perform their services in accordance with the standards of professional skill and care expected of consultants practicing in the geographic region in which the Project is located and experienced in the performance of such professional services. The acceptance or approval of, or payment for any of the documents or services provided by the Engineer under this Contract shall not release or waive any claim for latent defects or errors, or breaches of this Contract, negligence, indemnity or other obligations under this Contract.

1.3 DESIGN TO BE CODE COMPLIANT. The Engineer shall review laws, codes and regulations applicable to the Engineer's services on the Project. The Engineer's design and the plans and specifications (the "Construction Documents") for the Project shall be in compliance with the requirements imposed by governmental authorities having jurisdiction over the Project, including but not limited to applicable laws, regulations, building codes, and the Americans with Disabilities Act. The Engineer acknowledges that the College and any contractors and/or consultants engaged by the College will rely upon the accuracy and integrity of the Construction Documents in the construction of the Project.

1.4 ENGINEER'S REPRESENTATIONS AND WARRANTIES. By executing this Contract, the Engineer makes the following express representations and warranties to the College:

1.4.1 The Engineer is professionally qualified to act as the Engineer for the Project, is authorized to do business in the State of New Jersey, and is licensed to provide design/engineering services by all public entities having jurisdiction over the Engineer and the Project;

1.4.2 The Engineer shall maintain all necessary licenses, permits or other authorizations necessary to act as Engineer for the Project until the Engineer's duties have been fully satisfied;

1.4.3 The Engineer has visited and become familiar with the Project site and the local conditions under which the Project is to be designed, constructed and operated;

1.4.4 The Engineer shall prepare all Construction Documents, Instruments of Service and other things reasonably required by this Agreement, in such a manner that they shall be accurate, coordinated and adequate for construction all in accordance with the applicable standard of care and shall be in conformity and shall comply with reasonable interpretations of applicable law, building codes, and regulations, including the American with Disabilities Act;

1.4.5 The Engineer assumes responsibility to the College for the acts, errors and omissions of its subconsultants or others employed or retained by the Engineer in connection with the Project;

1.4.6 The Engineer is financially solvent, able to pay its debts as they mature and possessed of sufficient working capital to complete the services required and perform its obligations hereunder;

1.4.7 The Engineer is able to furnish the workplace, tools, materials, supplies, equipment and labor required to complete the services required hereunder and perform all of its obligations hereunder and has sufficient experience and competence to do so; and

1.4.8 The Engineer's execution of this Agreement and its performance is within its duly authorized power.

1.5 SUBCONSULTANTS. The Engineer shall employ or engage at its own expense the professional services of subconsultants as may be required for the performance of the services required by this Contract. All such professionals shall be qualified, competent, and licensed as required by the State of New Jersey, and shall be approved in advance in writing by the College. The Engineer shall not contract with any subconsultant to whom the College has made a reasonable written objection. Failure to object shall not relieve the Engineer of its duties, and it is the Engineer's obligation to choose appropriate subconsultants. The Engineer shall not substitute a subconsultant previously selected if the College makes a reasonable objection to such substitution. The Engineer shall be responsible to the College for all services performed by the Engineer's subconsultants. Nothing in this Contract is intended to create any legal or contractual relationship between the College and any subconsultants or independent professionals utilized by the Engineer.

1.5.1 Subconsultant Agreements. The Engineer shall enter into an agreement with each subconsultant pursuant to which the subconsultant assumes toward the Engineer all of the obligations that the Engineer assumes toward the College under this Contract. The Engineer shall, upon request, provide to the College copies of the Engineer's agreement with each subconsultant, including amendments thereto, for the College's information but not for approval. The College makes no representation that it is reviewing the agreement's substance or approving the agreement in any way.

1.5.2 Intended Third Party Beneficiary/Assignment of Subconsultant Agreements. The College is an intended third party beneficiary under any agreement entered into by the Engineer with a subconsultant in connection with this Project. The College shall have the right to enforce the terms of any agreement between the Engineer and its subconsultant directly against the subconsultant, without accepting any assignment of the subconsultant agreement, and that in such event the College shall be entitled to full and direct performance of the subconsultant agreement from subconsultant. The College's status as intended third party beneficiary does not constitute or create a contractual relationship between the College and any subconsultant and does not allow any subconsultant to enforce its agreement with the Engineer directly against the College. The Engineer agrees that the College can require or effect an assignment of the Engineer's rights under any subconsultant agreement upon termination of the Engineer for cause or for the College's convenience and the Engineer agrees to execute any and all documents required to effectuate such assignment. The Engineer shall cause a provision to such effect to be included in each agreement between the Engineer and its subconsultants.

1.5.3 Termination of Subconsultant Agreements. The College reserves the right to require the Engineer to terminate contracts or agreements with any subconsultants retained by the Engineer for performance of services under this Contract. Any compensation for which the College may be liable as a result of such termination shall be limited to amounts as described in Article 8.

1.6 COORDINATED SERVICES. The Engineer acknowledges that it is essential that all services in connection with the Project be coordinated, including services provided by the College. The Engineer shall coordinate the services of all its subconsultants for the Project, shall review and check all drawings and specifications and shall make modifications as necessary, to assure that they are integrated into a well-coordinated and complete set of documents prior to each submission. In addition, the Engineer shall coordinate its services with services provided by the College and the College's consultants and in-house personnel.

ARTICLE 2
SCOPE OF ENGINEER'S BASIC SERVICES

2.1 The Engineer's Basic Services consist of those described in this Article 2, and include normal structural, mechanical, plumbing, fire protection, electrical, and any other engineering services necessary to produce a complete and accurate set of Construction Documents for the Project, which convey the Project in a clear and buildable fashion for the contractor awarded the Construction Contract and result in a buildable Project.

2.1.1 The Engineer shall manage the Engineer's services, consult with the College, research applicable design criteria, attend project meetings, communicate with members of the Project team and report progress to the College.

2.1.2 The Engineer shall, at appropriate times, contact governmental authorities required to approve the Construction Documents and the entities providing utility services to the Project. In designing the Project, the Engineer shall respond to applicable design requirements imposed by such governmental authorities and by such entities providing utility services.

2.1.3 The Engineer shall assist the College in connection with the College's responsibility for filing documents required for the approval of governmental authorities having jurisdiction over the Project.

2.1.4 The Engineer shall provide all other services set forth in the RFP and/or Proposal.

2.2 DESIGN PHASE AND BIDDING PHASE SERVICES. The Engineer shall perform the services included in the following "Design Phases" (Program Document Phase, Schematic Design Phase, Design Development Phase, Final Construction Documents Phase, and Government Agency Review Phase) and Bidding Phase (any of the Design Phases and Bidding Phase maybe referred to as a "Design and Bidding Phase" and collectively they may be referred to as the "Design and Bidding Phases"):

2.2.1 Program Document Phase. The Engineer shall consult with the College and prepare program documents, which describe the College's Project goals, objectives and criteria. The program documents shall include:

(a) Project objectives, goals and needs;

(b) Project description, including narrative, and including site, location, size, capacity, and access;

(c) Conceptual drawings;

(d) Outline and initial specifications;

(e) Design criteria (including standards, College considerations, design and construction restraints, and expandability requirements);

(f) Limitations affecting design and construction work;

(g) Environmental and energy use analysis;

(h) Systems descriptions including, but not limited to, site utilities, telecommunications, CATV, security (cameras, emergency phones, access control, etc.), audio visual equipment, computers, acoustical systems, and interface with existing College utilities, systems, and facilities;

(i) Schedule for design and construction (milestones);

(j) Laws, regulations, requirements, and approvals needed;

(k) Insurance requirements for the Project;

(l) Alternate approaches;

(m) Information and documents needed from the College and other parties (e.g. borings, site description, surveys, and utility surveys);

(n) Project budget (and budget criteria); and

(o) All other items/services set forth in the RFP and/or Proposal.

At the completion of the Program Document Phase, the College will have a review period, which will be concluded with a review meeting attended by, at a minimum, a representative of the following disciplines: mechanical engineer, electrical engineer, information technology, audio/visual, and acoustician. The Engineer will prepare meeting minutes.

The Engineer shall provide all other Program Document Phase services set forth in the RFP and/or Proposal.

2.2.2 Schematic Design Phase. This phase shall begin after the College approves in writing the documents prepared in the Program Document Phase and authorizes this phase to begin. The Engineer shall prepare schematic design documents which illustrate the Project and the scale and relationship of the Project components. The schematic design documents shall include:

(a) Site evaluation and study;

(b) Site utility layouts, including but not limited to domestic water, sanitary, storm, electric, steam, fire water, condensate, data and CATV;

(c) Schematics of each building or facility. (Minimum 1/16" scale if possible);

(d) Space analysis;

(e) Plans, elevations, sections;

(f) Outline specifications for all disciplines, including information technology and audio/visual equipment;

(g) Building systems including, but not limited to, utilities, telecommunications, CATV, security, access control, computers and interface with existing College utilities, systems, and facilities;

(h) Energy consumption analysis;

(i) Estimate of cost of construction;

(j) Code review;

(k) List of reviewing agencies requiring submissions and approvals;

(l) Geotechnical Services for soils conditions for foundations and storm water management;

(m) Underground Utility Mapping within the area of work to horizontally locate existing utilities and to perform test pits to identify utility depths;

(n) Topographic Survey within area of work;

(o) Environmental Survey, including a lead based paint survey, a comprehensive asbestos containing materials survey, a mold/moisture evaluation, a general space environmental assessment, and identification of all hazardous waste visible and uncovered in the investigation. Asbestos survey shall include under carpets, all layers of flooring materials, all ceilings, exposed mechanical pipe insulation and elbows, and any other suspect materials. The report shall include recommendations for remedial options, and a cost estimate broken down by survey location or material;

(p) List of submissions for New Jersey Clean Energy Program and other energy rebate programs; N/A

(q) LEED checklist; N/A

(r) All other items/services set forth in the RFP and/or Proposal.

The Construction Cost estimate prepared by the Engineer's cost estimator will be reconciled with the College's cost estimator's Construction Cost estimate. The Engineer and its cost estimator shall attend a reconciliation meeting.

At the completion of the Schematic Design Phase, the College will have a review period, which will be concluded with a review meeting attended by, at a minimum, a representative of the following disciplines: mechanical engineer, electrical engineer, information technology, audio/visual, and acoustician. The Engineer will prepare meeting minutes. Separate coordination meetings will be held with the College's cost estimator, commissioning agent and appropriate representation from the Engineer. The Engineer will prepare meeting minutes.

The Engineer shall provide all other Schematic Design Phase services set forth in the RFP and/or Proposal.

2.2.3 Design Development Phase. This phase shall begin after the College approves in writing the documents prepared in the Schematic Design Phase and authorizes this phase to begin. The Engineer shall prepare preliminary plans and specifications and related documents which describe the size, character and details of the Project including the structural, mechanical, electrical and other systems, materials, and other essentials as may be appropriate, and shall be based upon the approved program documents and approved schematic design documents. The documents shall show all work and materials required to construct the Project. The design development documents shall include for each building, facility or feature of the work:

(a) Plans, elevations, sections and other details pertinent to the features of the design;

(b) Specifications for all disciplines;

(c) Site plans;

(d) Utility distribution systems for all utilities from building(s) to the connection point of the main campus systems;

(e) Structural analysis;

(f) Mechanical analysis with single line diagrams and utility room sections;

(g) Electrical analysis with single line diagrams, load analysis and short circuit calculations;

(h) Information Technology analysis with single line diagram;

(i) Special features;

(j) Building systems, including information technology, audio visual equipment, access control, and acoustical systems;

(k) Proposed supplementary general conditions recommended by the Engineer and approved by the College to supplement the College's current general conditions;

(l) Revised estimate of the cost of construction;

(m) Civil plans;

(n) Updated code analysis report;

(o) Updated list of reviewing agencies requiring submissions and approvals, with estimated cost of review fees;

(p) Updates to geotechnical services, underground utility mapping and topographic surveys as required;

(q) Environmental remediation documentation;

(r) Submissions to New Jersey Clean Energy Program and other energy rebate programs; N/A

(s) Updated LEED Checklist; N/A

(t) Written response to issues identified during the review of the schematic design documents; and

(u) All other items/services set forth in the RFP and/or Proposal.

The Construction Cost estimate prepared by the Engineer's cost estimator will be reconciled with the College's cost estimator's Construction Cost estimate. The Engineer and its cost estimator shall attend a reconciliation meeting.

Design development documents will be submitted to the College's property insurer by the College. The Engineer shall review the College's property insurer's comments and incorporate them into the Construction Documents at no cost to the College. If any of the College's property insurer's comments require changes to the design and/or increase the expected Construction Cost, the Engineer shall notify the College and shall make all required changes to the design at no cost to the College.

At the completion of the Design Development Phase, the College will have a review period, which will be concluded with a review meeting attended by, at a minimum, a representative of the following disciplines: mechanical engineer, electrical engineer, plumbing engineer, information technology, audio/visual, acoustician, and civil engineer. The Engineer will prepare

meeting minutes. Separate coordination meetings will be held with the College's cost estimator, commissioning agent and appropriate representation from the design consultant. The Engineer will prepare meeting minutes.

The Engineer shall provide all other Design Development Phase services set forth in the RFP and/or Proposal.

2.2.4 Final Construction Documents Phase.

(a) **Document Preparation**. After documents in the Design Development Phase are completed and approved in writing by the College, the Engineer shall prepare final Construction Documents, including working plans and specifications for use in the actual performance of the construction work and permit procurement. They shall set forth in detail the work and materials and systems and other requirements needed to complete the construction of the entire Project. Documents shall include all applications, submissions, and responses required for the submission, review, and approval of all governing agencies. These documents shall be based upon and be consistent with the program documents, the schematic design documents, the design development documents, any other written instructions of the College, and all applicable laws, regulations, and building code and requirements. In preparing the final Construction Documents, the Engineer shall affect savings not inconsistent with the program and design development documents wherever possible, perform a constructability review, and reduce errors and omissions in the final working or construction plans and specifications. Within five (5) days of the completion of the constructability review, the Engineer shall submit to the College a letter stating that the constructability review has been completed and reporting the results of the constructability review.

(b) **Completeness of Documents.** The final plans and specifications shall set forth clearly all the work and materials and other requirements necessary to complete the construction of the Project, and shall include site development, utility plans, and information technology infrastructure and components. The submission shall include a written response to issues identified during the review of the design development documents. At the completion of the Final Construction Documents Phase, the College will have a review period, which will be concluded with a review meeting attended by, at a minimum, a representative of the following disciplines: mechanical engineer, electrical engineer, plumbing engineer, access control, information technology, audio/visual, acoustician, and civil engineer. The Engineer will prepare meeting minutes. Separate coordination meetings will be held with the College's cost estimator, commissioning agent and appropriate representation from the design consultant. The Engineer will prepare meeting minutes.

(c) **Specifications/Submittals.** The construction specifications shall include for each branch of work, such as general construction, HVAC, electrical, plumbing, fire protection, information technology, audio visual equipment, access control, and structural, a schedule or list identifying each paragraph of the specifications and item for which shop drawings and/or samples and/or permits and approvals and/or other submittals are to be submitted by the contractor before or during the construction work. They shall also include a separate list of all items required to be submitted by the contractor upon completion of the

Project, such as certifications, warranties, guarantees, bonds, maintenance and operating manuals, replacement parts, record drawings, permits and approvals.

(d) **Plan Format.** All final plans shall be plotted from AutoCAD, prepared in accordance with sound drafting and CADD practice, and shall be suitable for legible reproduction. Except as otherwise specified, sheets shall have overall dimensions of 30 inches by 42 inches maximum. All lettering shall be legible and suitable for reproduction. Final plans shall make reference to the College by incorporating the College title logo as it appears on College letterhead in a separate block of the title strip. The College's identification may be inserted below the identification of the Engineer-of-Record.

(e) **Bound Documents.** The final specifications shall be prepared so that when they are printed they can be bound in volume form and include an approved cover, a table of contents, the general conditions, the approved supplemental general conditions, the period of time specified for the construction of the Project as approved by the College, the College's forms to be utilized during construction administration, and any supplementary information recommended by the Engineer and approved by the College. The Engineer shall provide to the College disks with all program documents in Microsoft Word, Excel, or other College approved program.

(f) **Final Construction Documents Phase Submissions.** The Engineer shall make a drawing and specification progress submission at 50%, and 100% completion of the Construction Documents (DCA submission documents). The College will conduct an internal review of each submission and provide written comments. The Engineer shall revise the documents accordingly and provide a written response to the College's comments.

(g) **Cost Estimate**. The Engineer shall prepare a revised estimate of the Construction Cost based on the 50% and final Construction Documents, and report any changes from earlier estimates. The Construction Cost estimate prepared by the Engineer's cost estimator will be reconciled with the College's cost estimator's Construction Cost estimate. The Engineer and its cost estimator shall attend a reconciliation meeting with the College's cost estimator, commissioning agent and appropriate representation from the design consultant.

(h) **Review by the College's Property Insurer.** Construction Documents will be submitted to the College's property insurer by the College. The Engineer shall review the College's property insurer's comments and incorporate them into the final Construction Documents at no cost to the College. If any the College's property insurer's comments require changes to the design and/or increase the expected Construction Cost, the Engineer shall notify the College and shall make all required changes to the design at no cost to the College.

(i) **Environmental Remediation.** Update environmental remediation documentation.

(j) **Underground Utility Mapping.** Underground Utility Mapping within the area of work to horizontally locate existing utilities and to perform test pits to identify utility depths.

(k) **Topographic Survey.** Topographic Survey within area of work.

(l) **Environmental Survey.** Environmental Survey, including a lead based paint survey, a comprehensive asbestos containing materials survey, a mold/moisture evaluation, a general space environmental assessment, and identification of all hazardous waste visible and uncovered in the investigation. Asbestos survey shall include under carpets, all layers of flooring materials, all ceilings, exposed mechanical pipe insulation and elbows, and any other suspect materials. The report shall include recommendations for remedial options, and a cost estimate broken down by survey location or material.

(m) **LEED.** Provide an updated LEED checklist. N/A

(n) **Energy Rebate Programs.** Provide an update on the status of applications to the New Jersey Clean Energy Program and other energy rebate programs. Submit paperwork as required. N/A

(o) The Engineer shall provide all other Final Construction Documents Phase services set forth in the RFP and/or Proposal.

2.2.5 Government Agency Review Phase: After the Final Construction Phase Documents are completed and approved in writing by the College, the Engineer will assist the College with the reviewing agencies submissions. The Engineer will provide applications to the College with signed and sealed drawings as required by the reviewing agencies. The Engineer will provide responses to the review comments by the reviewing agencies to the College. Plan review through the Department of Community Affairs (DCA) is completed electronically and the Engineer shall make the electronic submissions. For applicable projects, the Engineer shall complete and submit DEP Attachment D – Major Stormwater Summary for Public Complexes when plans have been approved, after installation, and once the Certificate of Occupancy has been issued.

The Engineer shall provide all other Government Agency Review Phase services set forth in the RFP and/or Proposal.

2.2.6 Bidding Phase. After the Final Construction Phase documents are completed and approved in writing by the College, and after government agency review comments have been incorporated into the final Construction Documents, the College will solicit bids from single-prime contractors for the construction of the Project to submit fixed price bids for the work. The Engineer shall assist the College in the preparation of the invitation to bid documents based on the approved program documents and the final Construction Documents, and the bid documents shall be sufficient to enable bidders to submit fixed price bids. The bid documents shall include instructions to bidders, the final Construction Documents approved by the College including plans and specifications, the bid form, the form Construction Contract to be signed by the contractor, the College's general conditions, any supplementary general conditions approved by the College, and surety bond forms. The Engineer will attend the pre-bid

meeting, prepare meeting minutes, and will answer bidder questions through addenda issued by the College. After bids are received, the Engineer shall evaluate the bids and make written recommendations to the College regarding the bids and the bidders, including whether the bids conform to the bid documents and requirements, the responsibilities and qualifications of the bidders, and any other matters pertinent to the decision to award the Construction Contract. The Engineer shall also assist the College in the preparation, review and negotiation of the Construction Contract to be signed by the contractor awarded the Project by the College.

The Engineer shall provide all other Bidding Phase services set forth in the RFP and/or Proposal.

2.2.7 Other Items Applicable to Design and Bidding Phase Services

(a) **Copies and Electronic Versions of Design and Bidding Documents.** The Engineer shall provide electronic versions of all documents, as well as three (3) full size and five (5) half size sets of all documents at each submission throughout the Design and Bidding Phases.

(b) **Design Schedule.** Prior to the execution of this Contract, the Engineer shall submit to the College for approval, a comprehensive Design Schedule showing proposed tasks and dates for submission by the Engineer. The Engineer's Design Schedule shall be coordinated with the Milestone Design Schedule included in the RFP documents and set forth in Section 5.2.1. The Design Schedule initially shall include anticipated dates for commencement of construction and for substantial completion of the work. The Design Schedule must allow one (1) month review by the College between each phase. The Design Schedule shall also include allowances for the performance of the College's consultants and for approval of submissions by authorities having jurisdiction over the Project. Once approved by the College, time limits established by the Design Schedule shall not, except with reasonable cause, be exceeded by the Engineer. With the College's written approval, the Engineer shall adjust the Design Schedule, if necessary, as the project proceeds until the commencement of construction. The Engineer shall perform the services required in accordance with the approved schedule and time shall be of the essence for the Engineer's performance of such services.

(c) **Approvals by the College.** All documents prepared and submitted by the Engineer in each of the Design and Bidding Phases including all changes shall be subject to the written approval of the College as a condition of their use. Unless otherwise directed in writing by the College, the Engineer shall not proceed with any phase of the design work until the documents from the prior phase have been approved in writing by the College and the Engineer has been authorized to proceed.

(d) **Changes During Design.** The College may issue additional instructions and require additional work, services or changes not covered by this Contract at any time by written order. If design changes are made after the schematic design documents have been approved by the College, or if changes are made in the scope of the work after approval by the College of the design development documents and/or the final Construction Documents, and the changes require substantial reworking of the plans and specifications so as to cause the Engineer to incur extra drafting or similar expenses, the Engineer shall be entitled to compensation for the cost of the additional work and expenses. All changes to scope and

compensation shall be documented, prior to the commencement of the work, with a proposal from the Engineer and a Supplemental Service form from the College. In the event that the schedule does not allow for a proposal and Supplemental Service form, or a fee cannot be agreed upon, the additional fee shall be determined in accordance with Section 4.2.1. The Engineer will not be reimbursed for any clarifications or revisions of any plans or specifications or other documents submitted which are attributed to its own errors or omissions, deviations from the program documents, or earlier Design and Bidding Phase Documents which were approved.

(e) **Services, Information and Documents Required From Others for Design of Project.** The Engineer shall advise the College in writing of all services, information and documentation required from third-parties which are not included in this Contract, such as surveys of the building site, grades and lines of streets, pavements and adjoining properties; rights, restrictions, easements, boundaries and contours of the building site information as to existing sewer, water, gas and electrical services, borings, test pits and chemical, mechanical or other tests. The College shall, if it agrees, procure the services required from third-parties under separate contracts. The Engineer shall not be held responsible for the accuracy of information and documents provided by third-parties; however, the Engineer is not relieved of the responsibility for verifying such information to the extent that customary standards of the profession require doing so, and identifying apparent or obvious errors, omissions, discrepancies and/or inconsistencies. The Engineer shall visually inspect the site in connection with its review of information furnished by third-parties before using the information in performing this Contract. The Engineer shall coordinate its services with those services provided by the College and any consultants or third-parties retained by the College.

(f) **Conformed Documents.** The Engineer shall, concurrent with the award of the Construction Contract, issue four (4) consolidated/conformed sets of drawings and specifications after incorporating (a) addenda information issued during the bidding period, (b) accepted alternates, and (c) any other changes to be incorporated into the contract documents. These documents shall be identified in the revision box as "For Construction." They shall be submitted to the College, and with the College's approval, shall be issued for construction use within ten (10) working days after the Construction Contract award.

2.2.8 Construction Estimate and Budget Cap. The amount presently estimated and budgeted for the construction of the Project (exclusive of the cost of land, professional fees and furniture) is $2,500,000 for Phase 2 of the program outlined in the RFP. The Engineer agrees to develop a design and design documents, which result in a project Construction Cost, which does not exceed that amount. If the design at any state results in an estimate, which exceeds that amount, or if the lowest acceptable bid exceeds that amount when the project is bid, the Engineer shall provide alternative designs, materials and systems consistent with the program documents to reduce the Construction Cost to the foregoing budget amount at no cost to the College. If the College issues scope changes at any stage which increase the Construction Cost, the amount of the foregoing budget amount shall be increased accordingly.

2.2.9 Construction Cost. The Construction Cost shall be the total cost to the College to construct all elements of the Project designed or specified by the Engineer. The Construction Cost does not include the compensation to the Engineer and the Engineer's subconsultants, the costs of the land, rights-of-way, financing, contingencies for changes in the

work or other costs that are the responsibility of the College. The Construction Cost shall not include fees paid to professionals, attorneys, accountants, surveyors or other professional service providers. The Construction Cost shall include the cost at current market rates of labor and materials furnished by the contractor and equipment designed, specified, selected, or specially provided for by the Engineer, plus a reasonable allowance for the contractor's general conditions costs, overhead and profit. In addition, a reasonable allowance for contingencies shall be included for market conditions at the time of bidding and for changes in the work during construction.

2.3 CONSTRUCTION PHASE. The Engineer shall provide administration of the Construction Contract between the College and the contractor awarded the Construction Contract as set forth below. The Construction Phase will begin on the date specified in a notice to start construction, which will be issued by the College after it awards the Construction Contract and issues a notice to the contractor to proceed. The Construction Phase will end when the certificate of substantial completion is issued. The Engineer's Construction Phase services shall include:

2.3.1 Representation of College. The Engineer shall advise and consult with the College during the Construction Phase. The Engineer shall represent the College on the site, and advise the contractor of the Engineer's and the College's instructions and interpretations of the contract documents. The Engineer shall respond to Requests for Information (RFIs) from the Contractor within five (5) working days of receipt. The Engineer shall have authority to act on behalf of the College to the extent provided in this Contract and in the Construction Contract. However, the Engineer shall not issue change orders or directions involving changes in scope or cost without prior written authorization from the College.

2.3.2 Project Management Software. The Engineer shall utilize project management software, which is acceptable to the College, for managing the Project and shall provide the College with access to such software.

2.3.3 Observation/Evaluation of the Work. The Engineer and its subconsultants shall have access to the work at all times when it is in progress and shall make frequent visits to the site to maintain familiarity with the conditions, progress and quality of the work, and shall determine if the work is proceeding in accordance with the contract documents. On the basis of its on-site observations/evaluations, the Engineer shall endeavor to guard the College against defects and deficiencies in the contractor's work, or any failure of the contractor to comply with the contract documents and all applicable laws, codes and standards. In determining if technical aspects of the Project are completed properly, the Engineer shall have all disciplines, including its subconsultants, visit the site periodically, as is deemed necessary by the nature of the work or as required by the College, to observe their respective aspects of the work. The Engineer shall assist the College in documenting any non-performance by the contractor or its subcontractors, and shall assist the College by reporting construction defects and the effect of delays to the Project. The Engineer shall provide a report summarizing the conditions found during each site visit within five (5) working days after each visit. At a minimum, the Engineer's site visits and reports shall be performed prior to or after each job meeting.

2.3.4 Identification of Non-Conforming Work. The Engineer shall reject work which does not conform to the Contract Documents. The Engineer shall advise the College

when it deems inspection or testing of the work is necessary or advisable and shall have the authority, with the College's consent, to require such inspection or testing whether or not such work is fabricated, installed or completed. The Engineer shall recommend to the College in writing that the work be stopped wherever, in its reasonable opinion, such action is necessary for the proper performance of the Construction Contract.

2.3.5 Review of Contractor Payment Requests. The Engineer shall review contractor payment requests and the amounts requested, determine the amounts due under the Construction Contract, and certify the amount to be paid on each payment request within two (2) working days of receiving the requisition. The Engineer's certifications of contractor payment requests shall constitute a representation by the Engineer to the College based upon the Engineer's observations at the site and evaluation of the work, and upon its verification of the information in the requests, that the work has progressed to the point represented, that to the best of the Engineer's knowledge, information and belief, the quality of the work conforms to the Contract Documents, and that the contractor is entitled to payment in the amount certified. The Engineer's certification shall be subject to an evaluation of the work as a functioning whole upon completion, to the results of any subsequent tests required by the Contract Documents, to minor deviations from the Contract Documents to be corrected prior to completion, and to any specific qualifications stated by the Engineer in the certifications for payment. By issuing a certification for payment, the Engineer shall not be deemed to represent that it has made any examination to determine how and for what purpose the contractor has used monies paid to it under the Construction Contract. The Engineer shall maintain a record of the applications and certifications for payment, copies of which shall be sent to the College.

2.3.6 Interpretation of Contract. The Engineer shall be the interpreter of the requirements of the Contract Documents and the impartial judge of the performance thereunder in the first instance. The College can either act in accordance with the interpretation of the Engineer or take appropriate action as provided in this Contract and/or the Construction Contract.

2.3.7 Contractor Claim Review. The Engineer shall evaluate and make written recommendations to the College concerning claims submitted by the contractor and the execution and progress of the contractor's work.

2.3.8 Job Meetings. The Engineer shall attend regular job site meetings with the contractor and interested parties and report on and make written recommendations relative to the progress of the work. Job meetings shall be held at least every two weeks. Representatives of each discipline shall attend job meetings as requested by the College. The College shall prepare meeting minutes and the Engineer and Commissioning Agent shall review and sign off on the meeting minutes.

2.3.9 Changes.

(a) The Engineer may authorize minor changes in the work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the contract sum or an extension of the contract time. The Engineer shall provide notice to the

College of all such minor changes in the work. The College shall prepare change orders and construction change directives in accordance with the Contract Documents.

(b) **Records of Changes.** The Engineer shall maintain records relative to changes in the Work (including but not limited to all Change Orders and change directives), which shall be made available or provided to the College upon request. The Engineer shall independently provide to the College copies of records relating to material issues that in scope or collective substance affect the quality of materials on the Project, the cost of the work or the schedule, or that otherwise impact the College's established program.

(c) **Engineer's Review of Contractor Change Requests.** The Engineer shall review, and report in writing to the College, claims and change proposals submitted by the Contractor. The Engineer shall review the change request to determine that it clearly documents the scope and nature of the proposed change and that the costs or cost savings the contractor has identified appear complete and appropriate and are properly documented by receipts, invoices and time sheets. Within five (5) calendar days of receipt of a change order request, the Engineer shall provide the College with an analysis detailing (i) whether the change request is properly documented; (ii) any impact the change request will have upon the design, (iii) any effect the change request will have on compliance with laws or industry standards, (iv) the appropriate cost, if any, for the proposed change, (v) any impact the change request will have on the construction schedule, (vi) whether the claim is within the original scope of work and/or is shown on the plans and specifications; (vii) whether the change is the result of the Engineer's error or omission, scope change, field condition, etc., (viii) any effect the change request will have on property insurance rates or operating or maintenance costs, and (ix) whether in the Engineer's professional opinion the change request should or should not be approved by the College (with justification, citations to Drawings and Specifications, and reference to applicable communications with the contractor). If after such review and written recommendation, the College approves the proposed change, then the College shall prepare a change order in accordance with the Contract Documents. The College shall make the ultimate determination on all change requests.

(d) **Additional Engineer Services and Costs Attributable to Change Order.**

(i) If the Engineer determines that implementation of the requested changes would result in a material change to the Construction Contract that may cause an adjustment in the contract time or contract sum, the Engineer shall make a written recommendation in writing to the College, who may authorize in writing further investigation of such changes. Upon such authorization, and based upon information furnished by the contractor, if any, the Engineer shall estimate the additional costs attributable to a change in services of the Engineer. With the College's written approval, the Engineer shall provide those estimates for a Change Order or other appropriate documentation for the College's execution or negotiation with the contractor.

(ii) The Engineer shall revise the Construction Documents, prepare necessary supplementary documents, including sketches, drawings, specifications or other written instructions as reasonably necessary to establish the appropriateness of, and to

implement the work incorporated in the Construction Contract by Change Orders and change directions, subject to the provisions of Article 3 and Section 4.2.

(e) **Change Orders Caused by Errors and Omissions by the Engineer and its Subconsultants.**

(i) The Engineer will not be additionally compensated for engineering services related to Change Orders, or individual portions thereof, made necessary by the Engineer's or its subconsultants' errors and/or omissions. The College and Engineer shall provide notice to each other if and when errors and omissions are discovered during the Project to enable them to be cured at minimum cost and impact to the Project, but the failure to provide such notice shall not be a waiver of the right of the College to seek reimbursement and other damages from the Engineer.

(ii) Prior to final payment to the Engineer, the Engineer and the College shall meet in an effort to jointly reconcile any and all additional costs of the work, including all approved change orders, to determine the extent to which any of such costs constitute damages attributable to the errors and/or omissions on the part of the Engineer and/or its subconsultants. If the agreed upon total of such errors and omissions costs exceed the amount of the final payment to the Engineer, then the Engineer may not receive its final payment and may be required to pay the excess to the College within thirty (30) days of the meeting. If the Engineer and the College do not agree on the amount of such costs, then payment may be made or credit taken for the amount not in dispute and the disputed amount shall be determined pursuant to the dispute resolution procedure set forth in Article 7.

2.3.10 Schedule and Progress. The Engineer shall not delay the construction work. The contractor will be required by its contract to prepare and utilize a Critical Path Method ("CPM") schedule for the construction work, and to prepare and provide monthly updates during construction showing progress, delays, causes of delays, recommendations to address delays, and anticipated problems. The Engineer shall provide input to the contractor regarding the initial schedule and any updates regarding the time allowed for actions required of the College and the Engineer. When the CPM schedule is finalized and approved, the Engineer shall perform its services in accordance with the schedule so as not to delay the construction work. Should the Engineer cause a delay in the construction work and the College incurs damages or additional costs and/or expenses as a result of the Engineer's delay, the Engineer shall reimburse the College for all such damages, additional costs and/or expenses, and/or the College shall be entitled to withhold payment from the Engineer for the amount of such damages, additional costs or expenses.

2.3.11 Contractor Submittal Review. The Engineer shall review and approve or take other appropriate action upon the contractor's submittals such as shop drawings, product data, samples and other submittals for conformity and compliance with the Contract Documents, and render interpretations of drawings and specifications to ensure that the intent and meaning of the Contract Documents is faithfully carried out and understood by the contractor. Copies of all "Approved" or "Approved-as-Noted" shop drawings and other submittals shall be furnished by the Engineer to the College as they are being reviewed during the course of the Project. Prior to beginning work on the Project, the contractor shall furnish to the Engineer and the College for

their review and approval, a schedule setting forth the submittals that the contractor intends to submit to the Engineer for review and approval, the date upon which the contractor will make each such submittal, and the date upon which the Engineer shall complete its review of each such submittal, which in no event shall be less than ten (10) days ("Submittal Schedule"). The Engineer 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 Engineer shall 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 Engineer shall review and return such submittal within ten (10) working days of receipt. The Engineer shall maintain a record of submittals and copies of submittals supplied by the contractor.

2.3.12 Determination of Completion. The Engineer shall conduct inspections to determine the date of substantial completion of the Project, shall issue a certificate of substantial completion, shall prepare a list ("Punch List") of all remaining work to be completed and any work that is not in conformation with the Contract Documents and must be corrected prior to final completion and final payment to the contractor, shall prepare an estimate of the costs to complete any incomplete work and to correct any nonconforming work and shall assist the College in obtaining the Certificate of Occupancy from governing agencies. When the work is found to be substantially complete, the Engineer shall inform the College about the balance of the contract sum remaining to be paid to the contractor, including the amount to be retained from the contract sum for final completion or correction of the work based on the Engineer's estimate of the cost to complete any incomplete work and to correct nonconforming work.

2.3.13 Additional Representation. If more project representation is required at the site, the College may by a supplemental agreement in writing, authorize the Engineer to employ a project field representative at the expense of the College. The additional compensation for such services must be specified in the supplemental agreement.

2.3.14 Engineer shall provide all other Construction Phase services set forth in the RFP and/or Proposal.

2.4 POST CONSTRUCTION PHASE. The Post Construction Phase will begin at the issuance of the certificate of substantial completion, and will end upon completion of the Warranty Inspection set forth in Section 2.4.5 and completion of all of the services set forth in this Contract. The Engineer's responsibilities shall include:

2.4.1 Record Drawings. Before approving a certificate of final completion for the contractor, the Engineer shall obtain the completed as-built record plans from the contractor, transpose all annotations to the final tracings in the same AutoCAD format used to generate the original plans, designate the plans as record tracings, and provide both the contractor as-built plans and two (2) full size sets of final as-built tracings and electronic pdf and CAD files to the College before the Engineer approves the certificate of final completion.

2.4.2 Determination of Completion. The Engineer shall conduct inspections to determine the date of final completion of the project, shall conduct regular inspections to confirm punch list work has been completed by the contractor and nonconforming work has been

corrected by the contractor, shall assist the College in obtaining the Final Certificate of Occupancy from governing agencies, shall obtain written guarantees and all other documents and items required to be submitted by the contractor as a condition of final completion, shall ensure that the documents the contractor is required to submit to the College in connection with final completion are submitted in appropriate form in accordance with the Construction Contract, shall issue a certificate of final completion, and shall advise the College that the contractor is entitled to final payment under the Construction Contract.

2.4.3 Start-Up and Testing. The Engineer and its subconsultants shall assist the College in initial start-up and testing, adjusting and balancing, and training and consultation as required.

2.4.4 Update TCNJ Drawings. The Engineer shall provide an updated TCNJ campus map in AutoCAD to show any changes, and shall provide an updated TCNJ utility map to show utility infrastructure associated with the project. The College will provide Engineer with an AutoCAD drawing of the campus map and utility map.

2.4.5 Warranty Inspection. Approximately ten (10) months from the date of Substantial Completion, the Engineer shall conduct a visual inspection of the Project with the College and the contractor to determine whether any correction of work is required in accordance with the provisions of the Construction Documents. The Engineer shall prepare a Report.

2.4.6 Engineer shall provide all other Post Construction Phase services set forth in the RFP and/or Proposal.

ARTICLE 3
ADDITIONAL SERVICES

3.1 GENERAL. The services described in this Article 3 are not included in Basic Services unless so identified in Article 2, and they shall be paid for by the College as provided in this Contract, in addition to compensation for Basic Services. The services described in this Article 3 shall only be provided if authorized or confirmed in advance in writing by the College. No claims for additional services shall be made unless the College is notified prior to the Engineer's rendering such services and such services are approved by the College in writing. Approved Additional Services shall be billed monthly. Failure to strictly comply with these requirements shall constitute a waiver of any claim for such Additional Services. Notwithstanding anything herein to the contrary, the College shall have no obligation to pay for any Additional Services or Expenses caused by the Engineer's or its subconsultants' negligence or failure to perform in accordance with this Contract.

3.2 The following items shall be considered Additional Services

3.2.1 Providing more extensive representation at the site than is required under Basic Services, unless due to the errors and/or omissions of the Engineer.

3.2.2 Providing services required because of significant changes in the Project including, but not limited to, size, quality, complexity, or the College's schedule.

3.2.3 Preparing Drawings, Specifications, and other documentation and supporting data, and providing additional services in connection with a Change Order or construction change directive, unless due to a deficiency in the Construction Documents.

3.2.4 Providing new or additional Drawings or Specifications made necessary by the default of the Contractor or by major defects or deficiencies in the work of the contractor;

3.2.5 Providing services, other than the 10-month warranty inspection set forth in Section 2.4.5, after issuance of final payment, provided that the Engineer's post construction phase services have been fully completed.

3.2.6 Providing services in connection with an arbitration proceeding, or legal proceeding except where the Engineer is a party and/or where the Engineer is assisting the College defend against a claim caused, in whole or in part, by an error and/or omission by the Engineer.

3.2.7 Providing any other services not otherwise included in this Contract and not customarily furnished in accordance with generally accepted engineering practice, which are requested and authorized in advance in writing by the College as being Additional Services.

ARTICLE 4
COMPENSATION

4.1 COMPENSATION FOR BASIC SERVICES.

4.1.1 Contract Fee: For the Engineer's Basic Services described under Article 2, the College shall compensate the Engineer the fixed fee of $_____ which is allocated as follows:

PHASE	**PERCENTAGE OF FEE**	**AMOUNT**
Program Document Phase	%	$
Schematic Design Phase	%	$
Design Development Phase	%	$
Total of Construction Documents Phase and Government Agency Review Phase	%	$
Bidding Phase	%	$
Construction Phase	20%	$
Post Construction Phase	5%	$
SUBTOTAL	**100%**	**$**
DCA Permit Fee Allowance		
TOTAL		**$**

The Engineer may bill on a monthly basis up to the maximum of each phase.

4.2 COMPENSATION FOR ADDITIONAL SERVICES (AND LIMITATIONS)

4.2.1 Additional Services. For Additional Services that arise during the course of the Project and are expressly authorized in advance in writing by the College, the Engineer shall be compensated by a lump sum fee in accordance with a written supplemental agreement agreed to by the parties in advance of the Additional Services. Alternatively, at the election of the College, the Engineer may be compensated for the actual time spent on the Project (documented as required in Section 3.1) at the Engineer's standard hourly rates approved in advance in writing by the College and attached hereto, and actual expenses without any additional fee, markup or multiplier for overhead or profit or anything else. The hourly rates shall be capped at a 3% increase each year.

4.2.2 Extra Work for Damaged Work or Contractor Default. If the Engineer is required to provide professional services in connection with the replacement of any work damaged by causes beyond its control during construction, or in connection with a default of the contractor, it shall be compensated for its actual costs, but only in accordance with a written supplemental agreement in advance of the extra work.

4.2.3 Design Phase and Bidding Phase Changes. When the Engineer is entitled to be paid actual costs under Section 2.2.7(d) for extra work expressly authorized by the College in advance in writing during a Design and Bidding Phase, it shall be paid extra compensation on the same terms as provided in Section 4.2.1. Additional services provided by independent subconsultants to the Engineer under this Contract which are requested and approved by the College should be calculated by the subconsultants in accordance with this paragraph, and the Engineer will then be paid 1.1 times the costs billed by the subconsultants to the Engineer.

4.2.4 Design Phase and Bidding Phase Delays. The Engineer shall not be entitled to additional compensation for delays in the Design and Bidding Phases, including delays in the College's review of any of the Engineer's Design and Bidding Phase submissions, or in making decisions to authorize the project to continue to a subsequent phase.

4.2.5 Changes During Construction Phase. If the College authorizes changes and change orders during the construction and if the Engineer performs services in connection with those changes, it will be paid extra compensation on the same terms as provided in Section 4.2.1.

4.2.6 Construction Administration and Post Construction Phases Delays. The Engineer shall not be entitled to additional compensation as a result of delays during the Construction Administration and Post Construction Phases except as provided in this paragraph. If the actual construction period exceeds the period specified in the Construction Contract by twenty percent (20%) or more, through no fault of the Engineer or its subconsultants, the College may, by a supplemental written agreement, compensate the Engineer on a cost basis for periodic services beyond that time and rendered at the site during construction, such as weekly, bi-weekly or monthly observations and job site meetings. Any such additional compensation shall not include non-periodic services under this Contract, such as review of contractor submittals and observations which are not periodic, such as observations in connection with the substantial completion and final completion of the Project.

4.3 COMPENSATION FOR REIMBURSABLE EXPENSES.

4.3.1 The College will reimburse the following expenses, if it requests that they be incurred, in accordance with the State of New Jersey and College policies and procedures:

(a) Fees paid for D.C.A. permit applications, inspections, certificates of occupancy or approvals from other authorities at a rate of 1.1 times actual cost;

(b) Public notices, announcements and advertising at a rate of 1.1 times actual cost;

(c) Expense of overtime work, if specifically requested and authorized by the College in advance in writing. The fee is to be determined and agreed to by the College in writing prior to proceeding with work;

(d) Renderings and models, beyond those included in Basic Services, requested by the College, at prices to be agreed upon when authorized. The fee is to be determined and agreed to by the College in writing prior to proceeding with work;

(e) Expenses of transportation and living in connection with out-of-town travel, if specifically requested and authorized in advance in writing by the College. The fee is to be determined in writing prior to proceeding with work.

4.3.2 Expenses such as faxes, telephones, pagers, reproduction or copying of documents, travel, and postage and overnight express charges are included in the Contract Fee and are not to be billed as extras.

4.4 PAYMENTS TO THE ENGINEER.

4.4.1 Engineer shall prepare and submit monthly invoices for payments under this Contract. Each invoice submitted by the Engineer shall be based on the components of Basic Services that are itemized in Section 4.1.1 above and shall show the percentage of completion of each portion of the Basic Services and any Additional Services as of the end of the period covered by the invoice.

4.4.2 The amount of each interim payment to the Engineer shall be computed as follows:

(a) Take that portion of the Basic Compensation properly allocable to each itemized component of Basic Services and each component of any Additional Services as determined by multiplying the percentage completion of each portion of the services by the dollar amount of that component of services;

(b) Subtract the aggregate of previous payments made by the College; and

(c) Subtract any amounts withheld by the College for losses and other damages caused by the Engineer's and/or its subconsultants' breach of this Contract, failure to meet any deadlines imposed in this Contract, and/or negligent errors or omissions.

4.4.3 Payments are due and payable within thirty (30) days after the College's receipt of the Engineer's invoice with proper documentation. No interest shall be applied to late payments.

4.4.4 Subconsultant Portion of Fee. The Engineer shall submit with each invoice a certification that all associated subconsultants have been paid a proportionate share of any previous payments made under this Contract to the extent they are entitled.

4.4.5 Final Payment. Subject to Section 2.3.9(e)(ii), the final balance of the fee due under this Contract (with the exception of the portion of Engineer's fee for the Warranty Inspection to be conducted pursuant to Section 2.4.5) shall be paid not later than thirty (30) days after receipt of the final invoice, issuance of the certificate of final completion, and acceptance by the College that the Construction Contract is complete. Prior to final payment to the Engineer, the Engineer shall furnish evidence satisfactory to the College that there are no claims or obligations outstanding in connection with its services. Acceptance of final payment shall constitute a waiver of all claims by the Engineer for compensation for its services. Payment for the portion of the Engineer's fee for the Warranty Inspection shall be paid not later than thirty (30) days after the completion of the Warranty Inspection.

4.5 WAIVER AND RELEASE OF LIENS AND CLAIMS.

4.5.1 With each Application for Payment, Engineer and each of its subconsultants for whom payment is sought shall execute and submit as a condition of payment releases of liens and claims in a form acceptable to the College.

4.5.2 Upon final payment to Engineer, Engineer shall deliver to the College a certified accounting of final payment and release of liens and claims from Engineer and all subconsultants working through and under Engineer in a form acceptable to the College and an affidavit that so far as Engineer has knowledge or information, the releases include and cover all materials and services over which Engineer has control for which a lien could be filed.

4.5.3 If any lien remains unsatisfied after all payments are made or if any subconsultant or other person acting through and under Engineer files a mechanic's lien or claim or notice of intention or right to file a lien for or on account of the services furnished under or in connection with this Contract, Engineer 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 Engineer (such costs and expenses to include legal fees and disbursements). Engineer agrees to hold harmless and indemnify the College 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. The provision of this subparagraph shall survive termination of this Contract.

4.6 COST RECORDS. The Engineer shall maintain and retain weekly payroll, overhead, cost and accounting records for services performed on the Project, including costs and expenses pertaining to Additional Services required by the College and Reimbursable Expenses, and shall require its subconsultants on the Project to do likewise. These records shall be maintained in accordance with generally accepted accounting principles and practices. All such records shall be retained and made available to the College for inspection when requested for a period of seven (7) years after final payment is received by the Engineer under this Contract, or the duration of any dispute or lawsuit arising out of the Project, whichever is later. Any failure to maintain or produce such records shall preclude the Engineer from being paid or retaining any payments which are based on costs and expenses of it or its subconsultants which are reflected in the records.

ARTICLE 5
TIME OF PERFORMANCE

5.1 TIME IS OF ESSENCE. Time is of the essence in the Engineer's performance of its services under this Contract.

5.2 MILESTONE DESIGN SCHEDULE.

5.2.1 The Engineer shall perform its services under this Contract in accordance with the Milestone Design Schedule set forth below and the Design Schedule as set forth in Section 2.2.7(b) and the Construction Schedule to be developed by the contractor awarded the Construction Contract as set forth in Section 2.3.9.

PROJECT PHASE	**MILESTONE DATE/RANGE**
Program Document (PD) Phase….	**[4/1/23 to 6/15/23]**
Schematic Design (SD) Phase……	**[6/15/23 to 8/1/23]**
Design Development (DD) Phase…	**[8/1/23 to 9/1/23]**
Construction Documents Phase..…..	**[9/1/23 to 11/1/23]**
50% Documents Complete…….	[Insert Date]
Cost Reconciliation Complete……	[Insert Date]
100% Documents Complete……	[Insert Date]
Government Agency Review Phase...	**[11/1/23 to 12/15/23]**
Bidding Phase……..…	**[11/1/23 to 12/1/23]**
Construction Phase…….…	**[5/20/24 to 8/11/24]**
**Post Construction Phase ……..... **	**[8/11/24 to 9/15/24]**

5.2.2 By executing this Contract, the Engineer represents that the Milestone Design Schedule as set forth in Section 5.2.1 herein is reasonable for the scope of services to be performed under this Contract.

ARTICLE 6
THE COLLEGE'S RESPONSIBILITIES

6.1 Unless otherwise provided for under this Contract, the College shall provide information regarding requirements for and limitations on the Project, including the College's objectives, schedule, constraints and criteria, including space requirements and relationships, flexibility, expandability, special equipment, systems and site requirements.

6.2 The College shall establish and update an overall budget for the Project, along with input from the Engineer, including the Construction Cost, the College's other costs and reasonable contingencies with respect to all of these costs.

6.3 The College shall render decisions and approve the Engineer's submittals in a timely manner in order to avoid unreasonable delay in the orderly and sequential progress of the Engineer's services.

6.4 The College shall furnish surveys describing physical characteristics, legal limitations, and utility locations for the Project and a written legal description of the site. The surveys and legal information shall include, as applicable, grade and lines of streets, alleys, pavements and adjoining property and structures; adjacent drainage; rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries and contours of the site; locations, dimensions and necessary data pertaining to existing buildings, other improvements and trees; and information concerning available utility service and lines, both public and private, above and below grade, including inverts and depths. All the information on the survey shall be referenced to a Project benchmark.

6.5 The College shall furnish the services of consultants other than those designated in this Agreement, or authorize the Engineer to furnish them as an Additional Service, when the Engineer requests such services and demonstrates that they are reasonably required by the scope of the Project.

6.6 The College shall furnish all legal, insurance and accounting services, including auditing services, which may be reasonably necessary at any time for the Project to meet the College's needs and interests; provided, however, nothing herein shall be construed to require the College to pay for legal, accounting or other services provided for the protection or benefit of the Engineer.

6.7 The College shall provide written notice to the Engineer if the College becomes aware of any fault or defect in the Project, including errors, omissions or inconsistencies in the Engineer's Instruments of Service.

6.8 Before entering into the Construction Contract, the College shall coordinate the Engineer's duties and responsibilities set forth in the Construction Contract with the Engineer's services set forth in this Contract. The College shall provide the Engineer a copy of the executed Construction Contract.

6.9 The College shall provide the Engineer access to the Project prior to the commencement of the work and shall obligate the contractor awarded the Construction Contract for the Project to provide the Engineer access to the work wherever it is in preparation or progress.

ARTICLE 7
DISPUTE RESOLUTION

7.1 CLAIMS. The Engineer understands that any claims which it asserts against the College shall be subject to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq. The Engineer agrees that it shall not be entitled to assert claims against the College for any compensation beyond that provided for in this Contract by reason of the acts or omissions of any third parties except as provided in this Contract. The Engineer also agrees that it may not assert claims for consequential damages as that term is defined in law. The Engineer also agrees that suits against the College will be pursued in the State of New Jersey in the county where the project is located. Causes of action between the parties to this Contract pertaining to acts or failure to act shall be deemed to have accrued and the applicable statute of limitations shall commence to run in accordance with applicable law.

7.2 MEDIATION. 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 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 the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable in any court having jurisdiction thereof.

7.3 METHOD OF BINDING DISPUTE RESOLUTION. For any dispute or claim, not resolved by mediation pursuant to Section 7.2 (if applicable), 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 Section 7.4 of this Contract.

7.4 ARBITRATION.

7.4.1 Any claim, dispute or other matter in question arising out of or related to this Agreement subject to, but not resolved by, mediation may be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of this Agreement. A demand for arbitration shall be made in writing, delivered to the other party to this Agreement, 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 engineer and the other will be a contractor, all of whom shall be neutral and independent. This section shall not preclude the College or Engineer 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.

7.4.2 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.

7.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to this Agreement shall be specifically enforceable in accordance with applicable law in any court having jurisdiction thereof.

7.4.4 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.

7.5 CONSOLIDATION OR JOINDER.

7.5.1 The College, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

7.5.2 The College, at 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.

7.5.3 The College, at its sole discretion, may grant to any person or entity made a party to an arbitration conducted under this Section 7.5.3, whether by joinder or consolidation, the same rights of joinder and consolidation as the College under this Contract.

7.6 WORK DURING PENDENCY OF DISPUTE. Unless otherwise instructed by the College, the Engineer shall carry on its services during the pendency of any dispute hereunder, and the College shall continue making payments to the Engineer of undisputed amounts.

7.7 PROMPT PAYMENT CLAIMS. Notwithstanding the foregoing, disputes regarding 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).

7.8 DISPUTE RESOLUTION PROCESS IN SUBCONSULTANT CONTRACTS. Engineer shall include this dispute resolution process in all of its subconsultant contracts on this Project.

ARTICLE 8
TERMINATION, SUSPENSION, OR ABANDONMENT

8.1 SUSPENSION. The College may upon not less than three (3) days written notice suspend all or any part of the Project or the Engineer's services under this Contract. In the event of suspension by the College, the Engineer shall be compensated for services satisfactorily performed prior to notice of such suspension. If the College directs that the work on the Project resume within twelve (12) months after the College's suspension order, the Engineer shall be obligated to complete the Project for the Basic Fee provided for in this Contract, plus additional compensation for any work or documented expense necessitated by the stop order, to be approved by the College in writing before the work resumes.

8.2 TERMINATION FOR CAUSE. Either party may terminate this Contract upon not less than seven (7) days' written notice should the other party fail substantially to perform in accordance with the terms of this Contract through no fault of the party initiating the termination. If the College terminates this Contract because the Engineer has failed to perform in accordance with the terms of this Contract, the College shall be entitled to recover from Engineer or set-off against any sums due to Engineer, the College's damages and any costs of delay in replacing Engineer with a different Engineer. The College shall be entitled to withhold payment from Engineer until such damage may be calculated. If it is later determined that the Engineer was not properly terminated under this section, then the termination shall be deemed to be for the convenience of the College and the Engineer will be entitled to be reimbursed pursuant to Section 8.3 herein.

8.3 TERMINATION FOR CONVENIENCE. The College may terminate this Contract upon not less than seven (7) days' written notice to the Engineer for the College's convenience and without cause. In the event of termination not the fault of the Engineer, the Engineer shall be compensated for services satisfactorily performed prior to termination less payments previously made, together with Reimbursable Expenses then due and documented Termination Expenses. Termination Expenses are in addition to compensation for the Engineer's services and include expenses directly attributable to termination for which the Engineer is not otherwise compensated. In no event shall the Engineer be entitled to any amount for the Engineer's anticipated profit on the value of the services not performed by the Engineer.

8.4 STOP WORK. Unless otherwise directed, the Engineer shall immediately stop all work upon receipt of a notice of termination or suspension from the College. The College may order that the work on the Project be stopped temporarily, and on written notice, the Engineer shall cease all work on the Project except as necessary to properly secure the Project. In the event of a notice of termination, the Engineer shall furnish to the College reproducible electronic copies of all drawings, specifications and reports prepared by the Engineer and its

subconsultants to the date of termination, whether or not termination is due to the fault of the Engineer.

ARTICLE 9
MISCELLANEOUS PROVISIONS

9.1 CONTRACT FOR PERSONAL SERVICES. This Contract requires personal professional services by the Engineer, and the Engineer shall not assign or transfer its obligations or rights under this Contract without the written consent of the College.

9.2 PUBLICITY. Publicity and/or public announcements pertaining to the Project must be approved in writing by the College prior to release.

9.3 NO CONFLICT OF INTEREST. Except with the College's knowledge and written consent, the Engineer shall not engage in any activity, or accept any employment, interest or contribution that would reasonably appear to compromise the Engineer's professional judgment with respect to this Project.

9.4 CONFIDENTIAL INFORMATION. The Engineer shall maintain the confidentiality of information specifically designated as confidential by the College, unless withholding such information would violate applicable law. The Engineer shall require its subconsultants to maintain the confidentiality of information specifically designated as confidential by the College.

9.5 BUILDING ACCESS. The Engineer 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).

9.6 DESIGNATED REPRESENTATIVES/KEY PERSONNEL.

9.6.1 Engineer's Designated Representatives/Key Personnel: The Engineer shall designate representative(s) authorized to act on behalf of the Engineer with respect to the Project. The Engineer's designated representatives are:

Engineer's Principal in Charge: _____

Engineer's Project Manager: _____

Mechanical Engineer: _____

Civil Engineer: _____

The Engineer shall not change its designated representatives or the individuals assigned to the Project absent true necessity. If circumstances compel it to do so, the substitution and the substitute individuals must be approved in advance in writing by the College.

9.6.2 College's Designated Representatives: The College shall designate representative(s) authorized to act on behalf of the College with respect to the Project. The College's designated representative are:

Project Manager: Dave McNamara

9.6.3 Decisions and authorizations on behalf of the College under this Contract must be approved by the Project Manager.

9.6.4 Agreements made and/or actions taken by the Engineer, which by their nature effect a change to this Contract, shall only be binding upon the College when such agreement or action is specifically authorized in writing, in advance, by the College's designated representative. Any change undertaken by the Engineer at the direction of anyone other than the College's designated representative(s), or without prior written authorization of the College's designated representative(s), is at the Engineer's own risk.

9.7 NOTIFICATIONS. All notices required under this Agreement shall be in writing, signed by the party giving same, and shall be deemed properly given if hand delivered or sent by reputable overnight courier, or by registered or certified U.S. mail, return receipt requested, postage pre-paid and addressed as follows:

9.7.1 Notice to the Engineer. Written notices from the College to the Engineer shall be addressed to:

9.7.2 Notice to the College. Written notices from the Engineer to the College should be addressed to:

Dave McNamara, Project Manager
Office of Facilities
The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718
Telephone No. (609) 771-2815
mcnamard@tcnj.edu

9.8 DISCRIMINATION IN EMPLOYMENT: The Engineer and any subconsultants engaged by it shall comply with N.J.S.A. 10:2-1 through 4 and N.J.S.A. 10:5-1 et seq., including N.J.S.A. 10:5-31 through 35, which prohibit discrimination in employment on public contracts. The statute and the rules and regulations promulgated thereunder shall be considered to be part of this Contract and binding upon the Engineer and its subconsultants. During the performance of this Contract, the Engineer agrees that:

9.8.1 Discrimination. It shall not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status or sex. The Engineer shall take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment without regard to their age, race, creed, color, national origin, ancestry, marital status or sex. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination, rate of pay or other forms of compensation and selection for training, including apprenticeship. The Engineer agrees to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of this non-discrimination clause.

9.8.2 Advertisements. The Engineer shall, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status or sex.

9.8.3 Notices. The Engineer shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice advising the labor union or workers' representative of the Engineer's commitment, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

9.8.4 Handicap. As required by N.J.S.A. 10:5-4.1, any unlawful discrimination against any person because of a physical handicap or any unlawful employment practice against such a person is prohibited unless the nature and the extent of the handicap necessarily preclude the performance of the particular employment duties.

9.9 PEER REVIEW OF PROJECT DESIGN. The College reserves the right at any time, at the College's expense, to perform a peer review on the Project design provided by Engineer hereunder, in whole or in part, as it exists at that time. If the result of such peer review identifies any (1) errors or omissions, (2) items to be redesigned in order to benefit from any recommended value engineering items, or (3) any other items to be redesigned for reasons resulting from the peer review to which the College agrees, then Engineer agrees that it will correct and/or incorporate any such items, as applicable, and update the design accordingly.

9.10 INDEMNIFICATION.

9.10.1 To the fullest extent permitted by law, the Engineer shall defend (except as provided in section 9.10.1(a) below), 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 services, 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 Engineer, a subconsultant, 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 subparagraph 9.10.3. 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 subparagraph 9.10.1.

(a) Notwithstanding the foregoing, the Engineer shall not be obligated to defend the Indemnified Parties from a professional liability claim asserted solely against the Indemnified Parties and to which the Engineer is not a party. Engineer still shall be required to indemnify and hold harmless the Indemnified Parties from a professional liability claim as set forth above.

9.10.2 In claims against any person or entity indemnified under this paragraph 9.10 by an employee of the Engineer, a subconsultant or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under paragraph 9.10 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Engineer or subconsultant under workers' compensation acts, disability benefit acts or other employee benefit acts, nor shall the same be limited by the types of limits of insurance carried or to be carried by the Engineer or any subconsultant pursuant to this Agreement or otherwise.

9.10.3 The indemnity, defense, and hold harmless set forth in subparagraph 9.10.1 shall be supplemented by the following:

(a) any claims or liens of subconsultants, 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 Engineer sums due under this Agreement;

(b) any fines, penalties, liquidated damages, assessments or other executions imposed by any governmental authority having jurisdiction over the Project by reason of the Engineer's failure to comply with any requirement of this Agreement;

(c) any losses, damages, or expenses incurred by reason of the Engineer's failure to obtain and maintain in force or cause to be obtained and maintained, the insurance required by the terms of this Agreement;

(d) any losses, damages, or expenses incurred by reason of any failure (whether or not specifically identified herein) by the Engineer to perform its obligations under the Contract Documents or any breach of this Contract;

(e) any claims, damages, or expenses incurred by reason of 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, under any applicable laws, codes, statutes, or regulations.

9.10.4 If any judgment is rendered against the Indemnified Parties for which indemnification is required under this paragraph 9.10, the Engineer shall satisfy and discharge it. The Engineer shall reimburse the College for reasonable attorney fees, costs and expenses incurred by the Indemnified Parties in the defense of such suit or claim.

9.10.5 The College shall give written notice to the Engineer of claims and suits for which indemnification may be claimed pursuant to this paragraph 9.10.

9.10.6 The foregoing obligations shall survive the completion of the services and final payment to the Engineer (or the sooner termination of this Agreement) with respect to all matters accrued during the term of this 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 paragraph 9.10.

9.10.7 The Engineer shall cause this provision (paragraph 9.10) to be included in all agreements with its subconsultants.

9.11 INSURANCE BY THE ENGINEER. The Engineer shall secure and maintain in force for the term of this Contract plus three (3) years following the final acceptance of the work, insurance coverage provided herein. All insurance coverage is subject to the approval of the College and shall be issued by an insurance company authorized to do business in the State of New Jersey and which maintains an A.M. Best rating of A- (VII) or better.

The Engineer shall provide the College with current Certificates of Insurance and endorsements (including but not limited to additional insured endorsements) for all coverage and renewals thereof which must contain the provision that the insurance provided in the certificate shall not be canceled or modified for any reason except after thirty (30) days written notice to the College. All insurance required herein shall contain a waiver of subrogation in favor of the College. All insurance required herein, except Workers' Compensation and Professional Liability, shall name 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 as additional insureds.

The Engineer expressly agrees that any insurance protection required by this Contract shall in no way limit the Engineer's obligations under this Contract, and shall not be construed to relieve the Engineer 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 this Contract or under any law.

9.11.1 Types and Minimum Amounts of Insurance Required

(a) **Commercial General Liability Insurance**

Commercial General Liability insurance written on an occurrence form including independent contractor liability, products/completed operations liability, contractual liability, covering but not limited to the liability assumed under the indemnification provisions of this contract including products and completed operations. The policy shall not include any endorsement that restricts or reduces coverage as provided by the ISO

CG0001 form without the approval of the College. The minimum limits of liability shall not be less than a combined single limit of one million dollars ($1,000,000) per occurrence, two million dollars ($2,000,000) general aggregate, two million dollars ($2,000,000) product/completed operations aggregate. A "per project aggregate" endorsement shall be included, so that the general aggregate limit applies separately to the project that is the subject of this contract.

(b) **Comprehensive Automobile Liability Insurance**

Engineer must maintain Comprehensive Automobile Liability insurance covering owned, non-owned, and hired vehicles. The limits of liability shall not be less than a combined single limit of one million dollars ($1,000,000) per occurrence.

(c) **Workers' Compensation Insurance and Employers' Liability Protection**

Engineer shall maintain Workers' 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 Engineer and any subconsultant/subcontractor who will be engaged in the performance of this 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.

(d) **Professional Liability Insurance**

Engineer must maintain Professional Liability Insurance with minimum limits of liability that shall not be less than a combined single limit of two million dollars ($2,000,000) per claim. The professional liability insurance shall be maintained for a period of not less than three (3) years following the actual completion and acceptance of the Project by the College's Contracting Officer. Should the Engineer change carriers during the term of this Contract, it shall obtain from its new carrier an endorsement for retroactive coverage.

9.11.2 Evidence of Insurance. The Engineer shall, when this Contract is signed and before beginning the services required under this Contract, provide the College with valid certificates of insurance and endorsements to evidence the Engineer's insurance coverage as required herein.

9.11.3 Remedies for Lack of Insurance. If the Engineer fails to renew any of its required insurance policies, or any policy is canceled, terminated or modified, the College may refuse to make payment of any monies due under this Contract. The College, in its sole

discretion and for its sole benefit, may purchase such insurance on behalf of the Engineer, and the Engineer shall pay the costs thereof to the College upon demand and shall furnish to the College the information needed to obtain such insurance. The College may also withhold monies due to the Engineer to attempt to obtain such insurance on behalf of the Engineer. During any period when the required insurance is not in effect, the College may, in its sole discretion, either suspend the services under this Contract or terminate this Contract.

9.11.4 Insurance by Engineer's Subconsultants. Except as modified by the College in writing, the insurance requirements set forth above, including without limitation the requirement to name the Additional Insureds, shall also apply to each of the Engineer's subconsultants. The Engineer shall be responsible for obtaining certificates of insurance and endorsements for all coverage and renewals thereof for each of its subconsultants prior to the subconsultant's commencement of services on the Project. The Engineer shall provide copies of all certificates of insurance and endorsements, evidencing the insurance and waivers of subrogation required to be furnished by its subconsultants under this Contract, to the College upon request.

9.12 OWNERSHIP OF DOCUMENTS. The drawings, specifications and other documents prepared by the Engineer for this Project are instruments of the Engineer's service, and the Engineer hereby transfers to the College all rights of ownership and use, including all common law, statutory and other reserved rights, including copyright, provided that the College pays all sums that are actually due and undisputed under the Agreement. The College shall retain all rights of ownership even if this Contract is terminated and/or the College decides not to proceed. The Engineer shall provide to the College originals of the Engineer's drawings, CAD files, specifications and other documents relating to the Project. CAD files shall be provided to the College at no additional cost with all copyrights associated with the use of that file in connection with the property. The College may use the CAD files as it deems appropriate including, but not limited to disseminating this information to other consultants. The Engineer's drawings, specifications, CAD files and other documents shall not be used by the College or others on other projects. To the extent that liability arises from the modification or misuse of the instruments of service by the College or another consultant retained by the College, the Engineer shall not be responsible for such modification or misuse. Nothing herein, however, shall diminish the professional liability of the Engineer and its subconsultants for design errors and/or omissions in the instruments of service. The Engineer for its own record purposes may retain copies of its documents including plans and specifications prepared prior to entering into this Agreement. The Engineer may use any designs or details that the Engineer prepared after entering into this Agreement only after obtaining the College's written consent to such use, which consent shall not be unreasonably withheld.

9.13 CONTRACT TERMS, CHANGES, AND LAW. This Contract constitutes the entire agreement between the College and the Engineer. The terms and conditions of this Contract may not be changed except by a writing signed by the Engineer and the College. If any provision of this Contract is found by any court of competent jurisdiction to be invalid, illegal or unenforceable, such provision shall be deemed to be modified to the minimum extent necessary to cause it to be valid, legal and enforceable and the invalidity, illegality or unenforceability of such provision prior to such modification shall not affect the other provisions of this Contract,

and all provisions not affected by the invalidity, illegality or unenforceability shall remain in full force and effect.

9.14 APPLICABLE LAW. This Contract shall be governed by the laws of the State of New Jersey.

9.15 ERRORS AND OMISSIONS.

9.15.1 Subject to the Applicable Standard of Care, if an error or omission in the Engineer's Services and/or any subconsultant's services is discovered prior to construction, the Engineer shall correct the error or omission and provide corrected drawings and specifications without any charge.

9.15.2 If an error or omission is discovered during construction and the required revision or addition affects the planned construction sequence of work and/or results in additional costs to the College, subject to the Applicable Standard of Care, then the Engineer will pay for the cost to have this instrument of service corrected or included, and compensate the College for construction costs to be associated with the added or revised work.

9.15.3 This provision shall in no way limit the rights and remedies of the College for breach of this Contract or other liability under the law. The College shall have the right to seek to recover any and all damages caused by the Engineer's breach of this Agreement and/or the Applicable Standard of Care, including but not limited to the increased costs of construction, the costs to remove, correct and/or replace installed Work as a result of errors and omissions, the expense of replacement design services, losses and expenses resulting from delays in the completion of construction and initial operation of the facility.

9.16 DISCREPANCIES. If there are any discrepancies between this Contract and the RFP, Proposal, and/or Addendum identified in this Contract and/or any other proposal referenced in or attached to this Contract, the terms and conditions of this Contract shall control and take precedence.

9.17 NO THIRD PARTY BENEFICIARY. Nothing contained in this Contract shall create a contractual relationship with or a cause of action in favor of a third party against either the College or the Engineer.

9.18 INTERPRETATION. The parties acknowledge that each party, and if it so chooses, its counsel, have reviewed and revised this Contract and that normal rules 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.

9.19 COMPLIANCE WITH PROCUREMENT STATUTES. The Engineer warrants and represents that this contract has not been solicited or secured, directly or indirectly, in a manner contrary to the laws of the State 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 Engineer has not and shall not violate the laws of the State of New Jersey relating to the procurement of or the performance of this Contract by any conduct, including the paying of any gratuity of any kind, directly or indirectly, to any College employee or officer. Any violation of this provision shall be cause for the College to terminate

this Contract, to retain all unpaid and/or unearned fees, and to recover all fees paid. The Engineer shall notify the College in writing of any interest which it or its subconsultants have in, or association with, any contractor, subcontractor, material supplier, consultant, or manufacturer, or other party which has any interest in this Project.

9.20 BUSINESS REGISTRATION SUBMISSIONS AND REQUIREMENTS (Compliance with P.L. 2009, c.315). The Engineer is to comply with the following New Jersey Business Registration of Public Contractors' provisions. P.L. 2009, c.315 (Chapter 57) amends and supplements the business registration provisions of N.J.S.A. 52:32-44 which impose certain requirements upon a business competing for, or entering into a contract with a State agency. Chapter 57 expands the requirement of business registration to business organizations competing for, or entering into a contract with the following public contracting agencies: state colleges and universities, and county colleges. Engineer requirements pursuant to P.L. 2009, c.315:

9.20.1 The Engineer must include proof of business registration at the time it submits a bid or proposal in response to a request for bids or proposals. For all other transactions, proof of business registration must be submitted before the issuance of a purchase order or contracting document.

9.20.2 The Engineer must provide written notice to its subconsultants, regardless of the level (tier) of the subconsultant, of the requirement to submit proof of business registration to the Engineer. The Engineer shall obtain and maintain on file the proof of business registration of each subconsultant.

9.20.3 Before final payment on the Contract is made by the contracting agency, the Engineer shall submit an accurate list and the proof of business registration of each subconsultant or used in the fulfillment of this Contract, or shall attest that no subconsultants were used.

9.20.4 The Engineer shall comply with the other provisions of P.L. 2009, c.315 and shall remit use taxes as required to the New Jersey Division of Taxation.

9.21 MULTIPLE COUNTERPARTS. This Contract may be executed in counterparts. All executed counterparts shall constitute one contract, and each counterpart is 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.

ACKNOWLEDGEMENT

IN WITNESS WHEREOF, the parties have duly executed this agreement on the date first above written.

THE COLLEGE OF NEW JERSEY

By_____
Dave McNamara,
AVP of Facilities

Date_____

By_____
Valarie McDuffie, Interim Treasurer

Date_____

By_____
Sharon Blanton
VP for Operations

Date_____

By_____
Anup Kapur, Executive Director of
Procurement Services

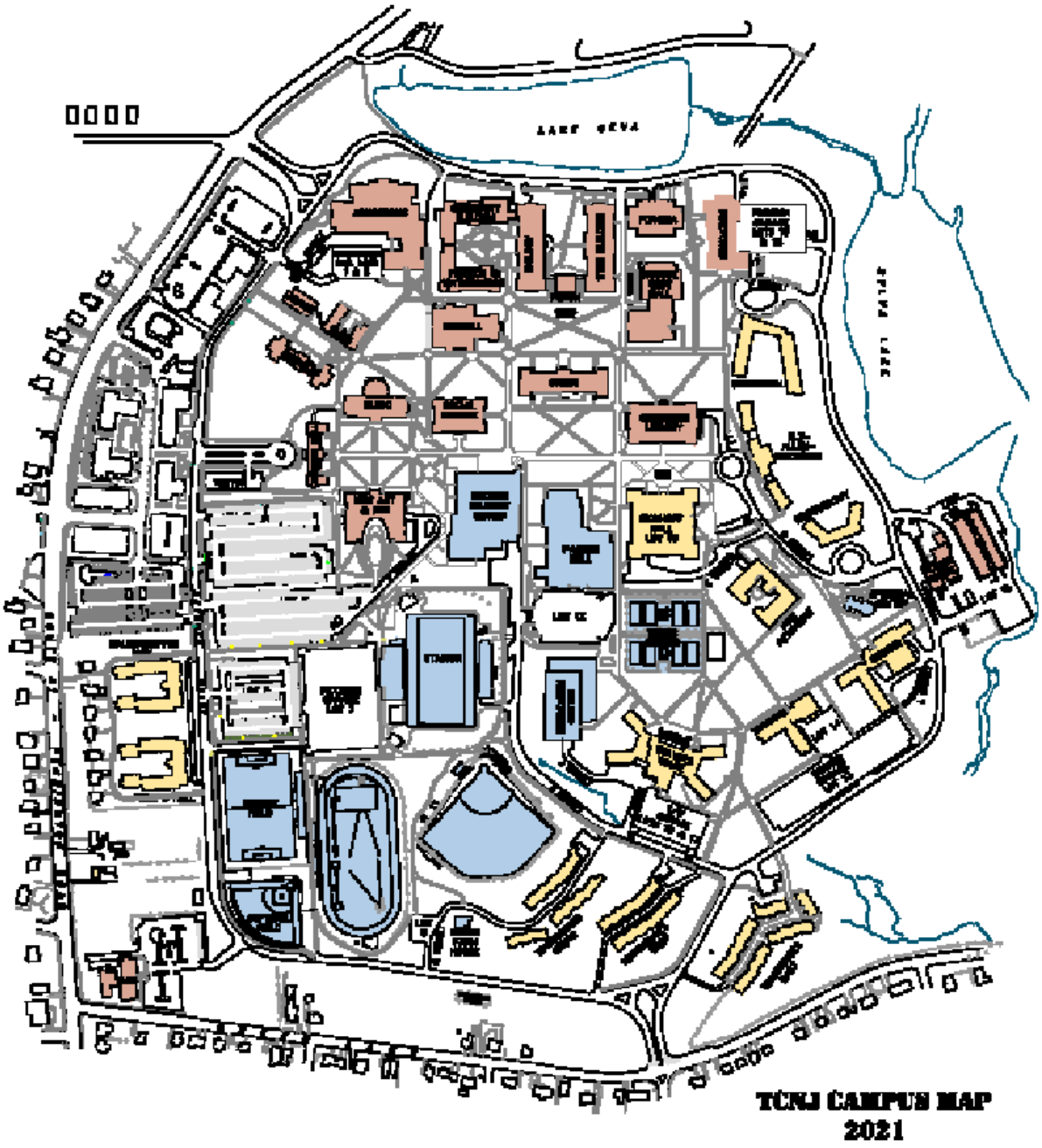
Date_____

ENGINEER

By_____
Name_____
Title_____

Date_____

Appendix B – Campus Map



Appendix C – Campus Map of Underground Steam District

GENERAL SHEET NOTES

1. THIS CAMPUS UTILITY SITE PLAN HAS BEEN DEVELOPED FROM A COMPILATION OF EXISTING CAMPUS AND BUILDING SITE DRAWINGS. THE PLAN IDENTIFIES GENERAL ROUTING OF THE UTILITY AND DOES NOT REPRESENT EXACT UTILITY LOCATION. PRIOR TO THE PERFORMANCE OF ANY UTILITY WORK AND/OR NEW CONSTRUCTION, A DETAILED SURVEY OF THE AFFECTED AREA SHALL BE PERFORMED TO IDENTIFY EXACT UTILITY LOCATIONS AND DEPTHS.

LEGEND

- EXISTING STEAM LINE
- EXISTING MANHOLE
- EXISTING STEAM/CONDENSATE LINE REQUIRING REPLACEMENT

- Installed since 2008
- VFA- MAP
- VFA-MAP but replaced in 2002

2013 New 2" PC & 2"HPC. Entech/A&J IX224

2014 Replaced: DLB 4" HPS; 2" PC

2014 Replaced: Entech/ PJM. 10" HPS; 6" PC; 2" HPC

2005 Replaced: Concord/?. 10" HPS; 6" PC; 2" HPC

2014 Replaced: Entech/ PJM. 10" HPS; 6" PC; 2" HPC

2002 has had condensate leaks

Replaced 2015: Entech/ Liberty. 6" HPS, 4" PC, 2" HPC

2009 Replaced: Trefz Eng. 4" HPS; 2-1/2" PC;

2014 Replaced: Entech/ PJM. 4" HPS; 2" PC; 1" HPC

2013: DLB/A&J. New 8" HPS; 4" PC, 1" HPC

2013 DLB/A&J. New 8" HPS; 4" PC; 1" HPC

2013: DLB/A&J. New 6" HPS; 2" PC

2005: Concord/7. 8" HPS, 6" PC, 2" HPC

2013: DLB/A&J X224. New 10" HPS; 5" PC; 2" HPC

2013: DLB/A&J New 4" HPS; 2" PC; 1-1/2" HPC

2013: DLB/A&J New 4" HPS; 2" PC; 1" HPC

2013: DLB/A&J New 8" HPS; 4" PC

Replaced 2018: DLB. 6" HPS; 4" PC; 1-1/2" HPC

Replaced 2008: Trefz Eng. 6" HPS; 4" PC; 1-1/2" HPC

2013: DLB/A&J New 8" HPS; 4" PC (Piping is slightly different need to update

2013: Small Section of 5" HPS & 2" PC to connect to new manhole. Line to Rec Center was in use for minimum time.

2013: DLB/A&J New 8" HPS; 4" PC

1 **CAMPUS STEAM AND CONDENSATE SITE PLAN**

Scale: 1"=150'-0"

0 150' 300'

N

Entech Engineering, Inc.
Engineering Architecture Construction
Corporate Office:
4 S. Fourth Street Reading, PA 19602
ph: 610.373.6667 fx: 610.373.7537
Pottsville, PA ph: 570.628.5655
Mountaintop, PA ph: 570.868.0275
Lititz, PA ph: 717.626.6666
www.entechengr.com 1.800.825.1372

ENTECH

The College of New Jersey
Ewing Township, NJ

REV.	DATE	APPD
C	11-17-2011	DB
B	09-12-2011	DB
A	03-02-2011	DB

FINAL SUBMISSION
PRE-FINAL SUBMISSION
ISSUED FOR CLIENT REVIEW
ISSUED FOR REVISED

COLLEGE OF NEW JERSEY
EWING, NJ

EXISTING UTILITY PLAN

EXISTING STEAM PLAN

SCALE: 1" = 150'
PREPARED BY: P. McCARTY
CHECKED BY: D. BROWN
APPROVED BY: D. BROWN
PROJECT NO.: 2315.01
DRAWING NO.:

STM1

Appendix D – Steam District Piping Condition Matrix

College of New Jersey **2/8/23** **Updated**

Underground Campus Steam Piping Condition Matrix

Campus Location	Manhole or Building Connection Point	Line Size (in)	Linear Footage (ft)	Year Constructed	Pipe Condition	Piping Replacement Schedule	Notes
High	CUP to MH 14	10	300	2014	Good		
High	MH 14 to Decker	4	75	2014	Good		
High	MH 14 to MH 13A	8	375	2014	Good		
High	MH 13A to New Res	4	50	2014	Good		
High	MH 13A to MH 13B	8	125	2014	Good		
High	MH 13B to MH 13C	8	200	?			
High	MH 13C to MH 13D	8	200	?			
High	MH 13D to MH 12	8	250	?			
High	MH 13D to Eickhoff	5	50	?			
High	MH 14 to MH14A	8	225	2014	Good		
High	MH 14A to Cromwell	4	300	2014	Good		
High	MH 14A to MH 14C	8	400	2014	Good		
High	MH 14C to Travers	5	50	2014	Good		
High	MH 14C to MH 14D	8	200	2014	Good		
High	MH 14D to Wolf	8	50	2014	Good		
High	MH 14D to Rec Center	4	300	?			Existing piping remained from 14D to Rec Center
High	MH12 to Packer	6	150	2014	Good		
Low	MH 12 to MH 11	10	300	2002	Fair	Replace within 10 years	
Low	MH 11 to Library	4	50	?			
Low	MH 11 to Green	4	50	?			
Low	MH 11 to MH 19	8	400	2007	Fair	Replace within 10 years	
Low	MH 19 to MH 20	6	150	2022	Good	Replace within 20 years	
Low	MH 20 to Social Sciences	6	50	2022	Good	Replace within 20 years	
Low	MH 20 to Brower	6	75	?			
Low	MH 20 to MH 21	6	175	2022	Good	Replace within 20 years	
Low	MH 21 to MH 21A	4	175	?			
Low	MH 21A to AIMM	4	100	?			
Low	MH 21A to MH 22	4	75	?			
Low	MH22 to Trenton	3	200	?			
Low	MH 22 to Music	4	150	?			
Low	MH 19 to MH 7	6	225	2014	Good	Replace within 20 years	
Low	MH 7 to Kendell	3	50	?			
Low	MH 7 to MH 8	4	300	2009	Fair	Replace within 10 years	
Low	MH 8 to Business	4	200	?			
Low	MH 8 to Bliss/Bliss Annex	4	350	?			
Low	MH 11 to MH 5	8	150	2002	Fair	Replace within 10 years	
Low	MH 5 to MH 15	6	400	2022	Good	Replace within 20 years	
Low	MH 15 to Biology	6	50	?			
Low	MH 15 to MH 17	6	400	2022	Good	Replace within 20 years	

Low	MH 17 to Science Complex	6	100	2020	Good	Replace within 20 years	
Low	MH 17 to MH 17A	6	100	2020	Good	Replace within 20 years	
Low	MH 17A to Armstrong	6	150	2020	Good	Replace within 20 years	
Low	CUP to MH 2	10	300	2014	Good	Replace within 20 years	
Low	MH 2 to Norsworthy	4	150	2014	Good	Replace within 20 years	
Low	MH 2 to MH 3	10	400	2005	Fair	Replace within 10 years	
Low	MH 3 to MH 4	10	350	2014	Good	Replace within 20 years	
Low	MH 4 to Centennial	4	250	2014	Good	Replace within 20 years	
Low	MH 4 to MH 5	8	400	2002	Fair	Replace within 10 years	
Low	MH 4 to MH 4A	8	400	2002	Fair	Replace within 10 years	
Low	MH 4 to EAB	4	50	?			
Low	MH 4A to Roscoe West	5	50	?			
Low	MH 4A to MH 4B	6	350	2002	Fair	Replace within 10 years	
Low	MH 4B to Forcina	5	50	?			
Low	MH 4 to Education	4	250	2017			
Low	MH 4B to MH STEM	6	450	2017	Good	Replace within 20 years	
Low	MH STEM to STEM	5	75	2017	Good	Replace within 20 years	
Low	MH STEM to Biology	4	200	2017	Good	Replace within 20 years	

Total Linear Footage of UG Steam Pipe on Campus 11,150

Appendix E – Campus Landscape Design Standards

Office of Facilities Management

Campus Landscape Design Standards

January 2023

VOLUME 1 of 1

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 020400 - ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all labor, materials, and equipment necessary and shall take all measures necessary to preserve and protect the site from environmental impact due to construction activities at the site during all phases of the project construction.

The required measures shall include, but are not necessary limited to confining the activities of his and his subcontractor's equipment and workmen to the actual construction area except as may be required for site ingress and egress; taking effective measures to minimize and control noise due to construction operations; complying with all municipal, State, and Federal regulations regarding open burning, air pollution control, and water pollution control, disposing of all surplus, unusable, and unsuitable excavated material, brush, trees, debris, and rubbish to State approved landfill areas outside the sites or to other approved offsite locations providing approved sanitary facilities in sufficient numbers for all workmen and visitors to the site, including the Engineer, their representatives, and representatives of all agencies authorized to visit the site; protection of all surface and groundwaters at the site, and in proximity to the site; and all else as described hereinafter and as required to fulfill the intent of this Section of the Specifications.

PART 2 – PRODUCTS

PART 3 – EXECUTION

3.1 METHODS OF CONSTRUCTION

Excavated soil material shall not be placed adjacent to any stream or body of water in a manner that will cause it to be washed away by high water or runoff.

Fording of any stream with construction equipment will not be permitted. Therefore, temporary bridges, culverts or other structures shall be used wherever stream crossings are necessary. Unless otherwise approved in writing by the Engineer, mechanized equipment shall not be operated in or near any stream.

Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made chemicals leading thereto.

The Contractor is advised that all storage and access areas must avoid environmentally sensitive areas and must be protected against erosion. The areas must be restored to a condition at least equal to that prior to use.

In addition, the prohibited construction procedures shall include, but are not limited to:

a. dumping of spoil material into any stream corridor, any wetlands, any surface waters, or at unspecified locations,

b. indiscriminate, arbitrary, or capricious operation of equipment in any stream corridors, any wetlands, or any surface waters,

c. pumping of silt-laden water from trenches or other excavations into any surface waters, any

stream corridors, or any wetlands,

d. damaging vegetation adjacent to or outside of the project site or the adjacent rights-of-way,

e. disposal of trees, brush, and other debris in any stream corridors, any wetlands, any surface waters, or at unspecified locations.,

f. permanent or unspecified alteration of the flow line of the stream, and

g. open burning of project debris

h. No dumping of spoils or storing/parking vehicles under the dripline of trees

and all other aspects of Guidelines as indicated in NJDEP "Environmental Guidelines for Planning, Designing, and Constructing Interceptor Sewers" shall be adhered to.

3.2 REGULATIONS AND PERMITS

The Contractor shall comply with all applicable Federal, State and local regulations governing the control of air, water pollution, and solid wastes and shall obtain, at no additional compensation, all permits as may be required.

3.3 DUST CONTROL

It is the obligation of the Contractor to keep all working areas free from dust during construction. The Contractor shall take effective measures including daily sweeping and watering of streets as required, and covered trucks, etc. to minimize dust production and spreading as a result of construction activities on the site and hauling operations off the site.

The Contractor shall sweep the paved street and sprinkle with water as necessary to control dust in unpaved streets, trench areas or excavation areas.

Pavement areas shall be swept clean to the trench at the end of each day's work.

If, in the opinion of the Engineer, the Contractor is not maintaining adequate dust control, the Engineer will notify the Contractor who shall promptly provide whatever methods and means are necessary to bring the dust under control.

Dust Control shall, in all respects, be the obligation of the Contractor and the costs thereof shall be included in the price bid for the various items in the Proposal.

3.4 NOISE CONTROL

It is the responsibility of the Contractor to control noise levels resulting from construction activities. The Contractor shall take effective measures to minimize noise produced by all construction operations, including the use of properly maintained and operating exhaust mufflers on his construction vehicles whether used on-site or off-site. Only adequately muffled machinery will be used and the number of equipment in operation at a given time shall be limited to only those needed for the immediate job.

The Contractor shall control the noise generated by his construction operations.

Noise caused by construction activities shall not exceed the levels permitted by applicable Federal, State or local regulations.

All construction equipment powered by an internal combustion engine shall be equipped with a properly maintained muffler.

Air compressors shall be operated in accordance with the manufacturer's instructions for proper noise abatement.

Air-powered equipment shall be fitted with pneumatic exhaust silencers.

The Contractor shall fully comply with all municipal ordinances regarding operation of powered construction equipment.

All requirements for noise control in N.J.A.C. 7:22-10.11 (n) and adopted changes shall be adhered to.

3.5 SITE RESTORATION

Final restoration shall be undertaken as soon as areas are no longer needed for construction, stockpile or access. Excavated stones and boulders shall be removed from the site to a specified location. Care shall be taken to avoid damage to adjacent vegetation and to prevent the formation of depressions which would serve as mosquito breeding areas.

3.6 WASTE MATERIALS DISPOSAL

The Contractor shall collect and dispose of waste materials encountered in or resulting from the work. The waste materials shall include but not be limited to the following:

a. Solid Waste: Equipment and materials resulting from demolition or restoration work, large pieces of asphalt or concrete, trees, stumps, bricks, wire, fences, drums, rubbish and construction debris generated by construction activities and rubble.

b. Liquid or Semi-Liquid Waste: Cleanings from basins, manholes, sewer mains, and channels including grit, sludge, scum and miscellaneous debris.

The Contractor shall collect and promptly dispose of all waste materials in the area of the work. Clean-up shall be done on a regular basis.

All materials and equipment which are not designated as reusable or salvageable by the Owner shall become the property of the Contractor. However, all materials and equipment designated as re-usable or salvageable by the Owner shall be carefully removed so as to cause minimum damages and stored at a designated area as directed by the Engineer or the Owner.

On contained work sites such as treatment plants or pumping station, containers suitable for the collection and disposal of waste shall be provided. On transport piping contracts, collection and disposal shall be a continuous function. The Contractor shall remove all waste materials before moving to other sections of the work.

Waste materials shall be disposed of at sites approved by the NJDEP's Office of Solid Waste Administration, which are compatible with the nature of materials being disposed. All waste types 10, 13, 23, 25 and 27 as defined in NJDEP's Non-Hazardous Wastes Regulations, generated by the Contractor during construction shall be disposed of at a NJDEP authorized site. A complete listing of sites currently authorized by the NJDEP may be obtained from the Office of Solid Waste

Administration, NJDEP, 32 East Hanover St., Trenton, N.J. 08625 (609) 984-4083.

Waste materials shall be transported by vehicles properly licensed to transport solid waste by the NJDEP, Office of Solid Waste Administration.

3.7 NJDEP REGULATIONS FOR ENVIRONMENTAL PROTECTION

The Contractor shall comply with all applicable local, State and Federal regulations.

END OF SECTION 020400

SECTION 021000 – SOIL EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the General Requirements, apply to work of this section.

1.02 SECTION INCLUDES

A. Installation of silt fence and hay bales.

B. Installation of gravel tracking pad.

C. Installation of construction barrier fence.

D. Temporary seeding.

E. Dust control.

1.03 RELATED SECTIONS

A. Section 2300 – Earthwork

1.04 REGULATORY REQUIREMENTS

A. All work shall comply with the requirements of the County Soil Conservation District and Standards for Soil Erosion and Sediment Control in New Jersey.

1.05 PRODUCT HANDLING

A. Protection

1. Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work of others.

B. Replacements

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Seed: Temporary seed shall be annual ryegrass.
Permanent seed shall be as specified in Section 2900-Landscaping.

B. Mulch: Mulch shall be salt hay or small grain straw.

C. Mulch Binder: Shall be emulsified asphalt or cutback asphalt.

D. Tracking Pad: Road filter pads shall be washed gravel or crushed stone, 2 ½" in size.

E. Filter Fabric Fence: Filter fabric fence shall be "Envirofence" with included posts as supplied by Cedar Hill, Inc. Somerset, New Jersey, or an approved equal.

F. Hay or straw bales shall conform to NJDOTSS Section 919.13 and shall be bound with wire or baling twine. The twine shall be polypropylene that has a knot strength of 170 pounds and straight break strength of 300 pounds, minimum.

G. Water for dust control shall be water with mineral content not exceeding potable water standards.

H. Silt fence may be commercially available silt fence systems, consisting of synthetic geotextile fabrics and hardwood stakes. The height of the fence shall be a minimum of two feet and the fabric shall be wide enough to allow for a minimum embedment in the ground of one foot of fabric. Sections shall be joined in such a manner that the fence shall function as a continuous unit.

I. Stakes for securing bales may either be steel or wood and shall conform to the Plans.

J. Miscellaneous materials shall conform to NJDOTSS sections 909.09 and 909.11

K. All other materials shall conform to the Plans as indicated on the details for Soil Erosion and Sediment Control and the NJDOT SS Supplemental Specifications, Section 111.

PART 3 – EXECUTION

3.01 GENERAL

A. The Engineer shall have the authority to limit the surface area of erodible earth material exposed and to direct the Contractor to provide immediate permanent or temporary soil erosion or sediment control measures to prevent contamination of adjacent watercourses and wetlands. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, pipes, slope drains and use of temporary mulches, mats, seeding or other control devices or methods as necessary to control erosion.

3.02 INSTALLATION

A. All sediment and erosion control practices shall be installed prior to any soil disturbance in their proper sequence and maintained until permanent protection is established.

B. Any disturbed areas that will be left exposed more than thirty days and not subject to construction traffic shall immediately receive a temporary seeding.

C. Immediately following initial disturbance or rough grading, all critical areas subject to erosion (i.e. steep slopes) shall receive a temporary seeding in combination with straw mulch or a suitable equivalent at a rate of 2 tons per acre according to State standards.

D. All silt fences and construction barrier fencing shall be in place prior to grading operations and installation of utilities.

E. All silt fences shall be left in place until construction is completed or areas are stabilized.

F. All disturbed areas shall be limed and fertilized prior to both temporary and permanent seeding. If temporary seeding occurs during winter months, no lime and fertilizer is required.

G. Disturbed areas including road banks shall be maintained in a rough graded condition and temporarily seeded and/or mulched until proper weather conditions exist for establishment of permanent vegetative cover.

H. All soil to be stockpiled for a period of greater than thirty days shall be temporarily seeded and protected by a berm at the base of the pile, if necessary.

I. Temporary Seeding:

1.	Lime	2 tons per acre ground limestone.
2.	Fertilizer	600 pounds per acre 10-20-10.
3.	Seed	2 pounds per 1000 sf of annual ryegrass.
4.	Hay	115 pounds per 1000 sf.

J. Permanent seeding shall be as specified in Section 02900.

K. All areas disturbed by on-site grading on which permanent or semi-permanent seeding (after October 15) or temporary seeding (after November 15) cannot be made, shall be treated by mulching at the rate of 70-90 pounds per square feet.

L. Inspection of all soil erosion control measures shall be frequent and repair or replacement shall be made promptly as needed.

M. To prevent blowing and movement of dust from exposed dry soil surfaces, when ordered by the Engineer, the Contractor shall spray water on the exposed areas in quantity as required.

END OF SECTION 021000

SECTION 022300 - SITE CLEARING

PART 1 - GENERAL

PART 2 - RELATED DOCUMENTS

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

2.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.

B. Related Sections include the following:
1. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
2. Division 2 Section "Tree Protection and Trimming" for protecting trees remaining on-site that are affected by site operations.
3. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
4. Division 2 Section "Landscaping" for finish grading, including placing and preparing topsoil for lawns and planting.

2.3 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

2.4 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

2.5 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Notify utility locator service for area where Project is located before site clearing.

PART 3 - PRODUCTS

3.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 4 - EXECUTION

4.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

4.2 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

4.3 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.

2. Arrange to shut off indicated utilities with utility companies.

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

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

4.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding 6-inch (150-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

4.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.

4.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

4.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 02230

SECTION 022400 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes construction dewatering.

B. Related Sections include the following:
   1. Division 2 Section "Earthwork" for excavating, backfilling, and site grading.

1.3 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, provide, test, operate, monitor, and maintain a dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.

   1. Work includes removing dewatering system when no longer needed.
   2. Maintain dewatering operations to ensure erosion is controlled, stability of excavations and constructed slopes is maintained, and flooding of excavation and damage to structures are prevented.
   3. Prevent surface water from entering excavations by grading, dikes, or other means.
   4. Accomplish dewatering without damaging existing buildings adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water.

   1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
   2. Include a written report outlining control procedures to be adopted if dewatering problems arise.
   3. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

D. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.

E. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform dewatering who has specialized in installing dewatering systems similar to those required for this Project and with a record of successful in-service performance.

B. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, resurvey benchmarks weekly, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.2 DEWATERING

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

B. Before excavation below ground-water level, place system into operation to lower water to specified levels and then operate it continuously until drains, sewers, and structures have been constructed and fill materials have been placed, or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.

D. Dispose of water removed from excavations in a manner to avoid endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner to avoid inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.

E. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on a continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to the Owner.

F. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

3.3 OBSERVATION WELLS

A. Provide, take measurements, and maintain at least the minimum number of observation wells or piezometers recommended by the engineer who prepared Shop Drawings as required in Paragraph 1.4 above.

B. Observe and record daily elevation of ground water and piezometric water levels in observation wells.

C. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. Suspend construction activities in areas where observation wells are not functioning properly until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

1. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

END OF SECTION 022400

SECTION 023000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Subsurface drainage backfill for walls and trenches.
4. Excavating and backfilling trenches within building lines.

B. Related Sections include the following:
1. Division 2 Section "Site Clearing" for site stripping, grubbing, removing topsoil, and protecting trees to remain.
2. Division 2 Section "Dewatering" for lowering and disposing of ground water during construction.
3. Division 2 Section "Landscaping" for finish grading, including placing and preparing topsoil for lawns and plantings.

1.3 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.

B. Base Course: Layer placed between the subbase course and asphalt paving.

C. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.

1. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10 feet (3 m) in width and pits more than 30 feet (9 m) in either length or width.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 cu. yd. (0.76 cu. m) for bulk excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.
2. Drainage fabric.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.

D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2- inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

F. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (38-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (38-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2- inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

2. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

    a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

3. Rock excavation includes removal and disposal of rock.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 3 inches (75 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.6 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Engineer.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

C. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

D. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.10 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.11 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 12 inches (300 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches (150 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill material at 90 percent.

3.12 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Walks: Plus or minus 1 inch (25 mm).
3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.13 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6-inch (150-mm) course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 6 inches (300 mm) of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches (150 mm).

1. Compact each course of filter material to 95 percent of maximum dry density according to ASTM D 698.
2. Place and compact impervious fill material over drainage backfill to final subgrade.

3.14 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on prepared subgrade and as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches (150 mm) or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.15 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:

1. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
2. When compacted thickness of drainage course is 6 inches (150 mm) or less, place materials in a single layer.
3. When compacted thickness of drainage course exceeds 6 inches (150 mm), place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.

3.16 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet (30 m) or less of wall length, but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet (46 m) or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

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

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 023000

SECTION 029000 - LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Trees.
2. Shrubs.
3. Ground covers.
4. Plants.
5. Lawns.
6. Topsoil and soil amendments.
7. Fertilizers and mulches.
8. Stakes and guys.
9. Landscape edgings.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
2. Division 2 Section "Earthwork" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

1. Manufacturer's certified analysis for standard products.
2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.

E. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

F. Planting schedule indicating anticipated dates and locations for each type of planting.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."

1. Selection of trees and shrubs purchased under allowances will be made by Architect, who will tag stock at their place of growth before they are prepared for transplanting.

D. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

C. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association's (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

D. Trees and Shrubs: Deliver freshly dug trees and shrubs. Do not prune before delivery, except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery.

1. Immediately after digging bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

E. Handle balled and burlapped stock by the root ball.

F. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots in water for 2 hours if dried out.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Warrant the following living planting materials for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner,

abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.

1. Trees.
2. Shrubs.
3. Ground covers.
4. Plants.

C. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.

D. Replace planting materials that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

E. A limit of one replacement of each plant material will be required, except for losses or replacements due to failure to comply with requirements.

1.9 TREE AND SHRUB MAINTENANCE

A. Maintain trees and shrubs by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings. Maintain trees and shrubs for the following period:

1. Maintenance Period: 12 months following Substantial Completion.

1.10 GROUND COVER AND PLANT MAINTENANCE

A. Maintain ground cover and plants by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings for the following period:

1. Maintenance Period: 6 months following Substantial Completion.

1.11 LAWN MAINTENANCE

A. Begin maintenance of lawns immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 60 days after date of Substantial Completion.

    a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time, continue maintenance during next planting season.

2. Sodded Lawns: 30 days after date of Substantial Completion.

B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches (100 mm).

1. Water lawn at the minimum rate of 1 inch (25 mm) per week.

D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. (0.5 kg per 100 sq. m) of lawn area.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Label each tree and shrub with securely attached, waterproof tag bearing legible designation of botanical and common name.

D. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

2.2 SHADE AND FLOWERING TREES

A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required.
1. Branching Height: 1/2 of tree height.

B. Small Trees: Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height, and branching recommended by ANSI Z60.1, and stem form as follows:
1. Form: Multistem, clump, with 2 or more main stems.

C. Provide balled and burlapped trees except where bare-root trees are indicated.

1. Container-grown trees will be acceptable in lieu of balled and burlapped trees subject to meeting ANSI Z60.1 limitations for container stock.

2.3 DECIDUOUS SHRUBS

A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

B. Provide balled and burlapped deciduous shrubs except where bare-root deciduous shrubs are indicated.

1. Container-grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to meeting ANSI Z60.1 limitations for container stock.

2.4 CONIFEROUS EVERGREENS

A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.

B. Provide balled and burlapped coniferous evergreens.

1. Container-grown coniferous evergreens will be acceptable in lieu of balled and burlapped coniferous evergreens subject to meeting ANSI Z60.1 limitations for container stock.

2.5 BROADLEAF EVERGREENS

A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.

B. Provide balled and burlapped broadleaf evergreens.

1. Container-grown broadleaf evergreens will be acceptable in lieu of balled and burlapped broadleaf evergreens subject to meeting ANSI Z60.1 limitations for container stock.

2.6 GROUND COVERS AND PLANTS

A. Provide ground covers and plants established and well rooted in removable containers or integral peat pots and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated.

2.7 GRASS MATERIALS

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.

1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on the plans.

B. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

1. Species: Provide sod of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.8 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1/2 inch or larger in any dimension, and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on the site. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Supplement with imported topsoil when quantities are insufficient. Clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

2.9 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.

1. Provide lime in the form of dolomitic limestone.

B. Aluminum Sulfate: Commercial grade, unadulterated.

C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

F. Peat Humus: For acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.

G. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

1. When site treated, mix with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cu. ft. (cu. m) of loose sawdust or ground bark.

H. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

I. Herbicides: EPA registered and approved, of type recommended by manufacturer.

J. Water: Potable.

2.10 FERTILIZER

A. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.11 MULCHES

A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
   1. Type: Unrotted pine straw, salt hay or threshed straw.

B. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.

C. Asphalt Emulsion Tackifier: Asphalt emulsion, ASTM D 977, Grade SS-1, nontoxic and free of plant growth- or germination-inhibitors.

D. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

2.12 WEED-CONTROL BARRIERS

A. Sheet Polyethylene: Black, 0.006-inch (0.15-mm) minimum thickness.

2.13 EROSION-CONTROL MATERIALS

A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

2.14 STAKES AND GUYS

A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches (50 by 50 mm) by length indicated, pointed at one end.

B. Guy and Tie Wire: ASTM A 641 (ASTM A 641M), Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch (2.7 mm) in diameter.

C. Guy Cable: 5-strand, 3/16-inch (4.8-mm) diameter, galvanized-steel cable, with zinc-coated turn buckles, 3-inch- (75-mm-) long minimum, with two 3/8-inch- (10-mm-) galvanized eyebolts.

D. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch (13 mm) in diameter, black, cut to lengths required to protect tree trunks from damage.

E. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

2.15 MISCELLANEOUS MATERIALS

A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's instructions.

B. Trunk-Wrap Tape: Two layers of crinkled paper cemented together with bituminous material, 4 inches (102 mm) wide minimum, with stretch factor of 33 percent.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, and secure Architect's acceptance before the start of planting work. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.

B. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.

1. A "Planting Soil Amendments Schedule" is included at the end of this Section.

C. For tree pit or trench backfill, mix planting soil before backfilling and stockpile at site.

D. For planting beds and lawns, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

1. Mix lime with dry soil prior to mixing fertilizer. Prevent lime from contacting roots of acid-tolerant plants.

3.4 LAWN PLANTING PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous materials.

C. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement to a depth not less than 5 inches. Do not spread if planting soil or subgrade is frozen.

1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.
2. Allow for sod thickness in areas to be sodded.

D. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

1. Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.
2. Till surface soil to a depth of at least 6 inches (150 mm). Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
3. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
4. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.

F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.5 GROUND COVER AND PLANT BED PREPARATION

A. Loosen subgrade of planting bed areas to a minimum depth of 6 inches (150 mm). Remove stones larger than 1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.

B. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

C. Till soil in beds to a minimum depth of 8 inches (200 mm) and mix with specified soil amendments and fertilizers.

D. Remove soil to a minimum depth of 8 inches (200 mm) and replace with prepared planting soil mixture.

3.6 EXCAVATION FOR TREES AND SHRUBS

A. Pits and Trenches: Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.

1. Balled and Burlapped Trees and Shrubs: Excavate approximately 1-1/2 times as wide as ball diameter and equal to ball depth, plus the following setting layer depth:

a. Setting Layer: Allow 3 inches (75 mm) of planting soil.
b. Setting Layer: Allow 9 inches (225 mm) of planting soil.

B. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

E. Fill excavations with water and allow to percolate out, before placing setting layer and positioning trees and shrubs.

3.7 PLANTING TREES AND SHRUBS

A. Set balled and burlapped stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

1. Place stock on setting layer of compacted planting soil.
2. Remove burlap and wire baskets from tops of balls and partially from sides, but do not remove from under balls. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Dish and tamp top of backfill to form a 3-inch- (75-mm-) high mound around the rim of the pit. Do not cover top of root ball with backfill.

C. Wrap trees of 2-inch (50-mm) caliper and larger with trunk-wrap tape. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping.

3.8 TREE AND SHRUB PRUNING

A. Prune, thin, and shape trees and shrubs as directed by Architect.

B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by Architect, do not cut

tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are size after pruning.

3.9 TREE AND SHRUB GUYING AND STAKING

A. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend at least 72 inches (1800 mm) above grade. Set vertical stakes and space to avoid penetrating balls or root masses. Support trees with 2 strands of tie wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Guying and Staking: Guy and stake trees exceeding 14 feet (4.2 m) and more than 3-inch (75-mm) caliper unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches (760 mm) long, driven to grade. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.

3.10 PLANTING GROUND COVER AND PLANTS

A. Space ground cover and plants as indicated.

B. Space ground cover and plants not more than 24 inches (600 mm) apart.

C. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.11 SEEDING NEW LAWNS

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.

B. Sow seed at the rates indicated on the plans.

C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.

D. Protect seeded slopes exceeding 1:4 against erosion with erosion-control blankets installed and stapled according to manufacturer's recommendations.

E. Protect seeded slopes exceeding 1:6 against erosion with jute or coir-fiber erosion-control mesh installed and stapled according to manufacturer's recommendations.

F. Protect seeded areas with slopes less than 1:6 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 50 to 90 pounds per 1000 square feet to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.
2. Anchor straw mulch by spraying with asphalt-emulsion tackifier at the rate of 10 to 13 gal. per 1000 sq. ft. (41 to 53 L per 100 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) thick and roll to a smooth surface.

3.12 HYDROSEEDING NEW LAWNS

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.
2. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.
3. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre (5.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre (11 kg per 100 sq. m).

3.13 SODDING NEW LAWNS

A. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below the sod.

3.14 RECONDITIONING LAWNS

A. Recondition existing lawn areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil

drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

C. Where substantial lawn remains, mow, dethatch, core aerate, and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

D. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.

E. Till stripped, bare, and compacted areas thoroughly to a depth of 6 inches (150 mm).

F. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Provide new planting soil as required to fill low spots and meet new finish grades.

G. Apply seed and protect with straw mulch as required for new lawns.

H. Water newly planted areas and keep moist until new grass is established.

3.15 INSTALLATION OF MISCELLANEOUS MATERIALS

A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.

1. When deciduous trees or shrubs are moved in full-leaf, spray with antidesiccant at nursery before moving and again 2 weeks after planting.

3.16 CLEANUP AND PROTECTION

A. During landscaping, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.18 PLANTING SOIL AMENDMENTS SCHEDULE

A. Lawns: Provide soil amendments based upon recommendations made by qualified professionals and recognized standards, subject to Owner’s approval:

3.19 MAINTENANCE OF SEEDED LAWNS

A. Contractor shall maintain seeded lawns until acceptance by the Landscape Architect and Engineer.

B. The Contractor's responsibility for maintenance is to be continuous to the time of final acceptance of the work. It is to include, but not be limited to, reseeding of areas that have not rooted properly, watering, mowing, weeding and reworking as follows:

1. Reseeding of any bare areas.

2. Proper and adquate watering.

3. Refilling of rain washed gullies and rutted areas.

4. Refertilization and lime application if recommended by soil tests and weed and pest control.

5. Reworking and reseeding of any areas which fail to show a uniform stand or grass shall be done at the Contractor's expense with the same seed mixture applied at the rate originally used and repeated until all areas are covered with a satisfactory stand of grass.

6. Mowing grass and weeks to a height of 2" to 3" when grass attains height of 4" or when growth tends to smother new seedlings. A minimum of three mowings are to be completed before final inspection and a minimum of three mowings are to be completed after grass has been accepted. Do not cut off more than 1/3 of the plant

7. If seeded in fall and not given 60 days of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable lawn is established.

END OF SECTION 029000

SECTION 029200 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Seeding.

2. Fertilizing.

3. Mulching.

B. Related Sections include the following:

1. Division 2 Section "Site Clearing" for topsoil stripping and stockpiling.
2. Division 2 Section "Earthwork" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

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

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass, identifying source, including name and telephone number of supplier.

C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.

D. Qualification Data: For landscape Installer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Planting Schedule: Indicating anticipated planting dates for each type of planting.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil topsoil.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 SCHEDULING

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion. These periods may be extended or reduced according to prevailing weather conditions and growers' recommendations.

1. Spring Planting: April 1-May 31.

2. Fall Planting: August 15-October 15

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 60 days from date of Substantial Completion.

a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch (25 mm) per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow grass to 2 ½ - 3 inches high. Do not cut off more than 1/3 or the plant

E. Lawn Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to lawn area.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.3 percent weed seed. Preferred seed is Branch Creek Evolution

Proportioned by weight as follows:

a. 80 percent tall fescue with three different varieties
b. 10 percent Kentucky bluegrass
c. 10 percent perennial ryegrass

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 5 percent organic material content; free of stones ½ inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

    a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a minimum 75 percent passing through No. 60 (0.25-mm) sieve.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

C. Aluminum Sulfate: Commercial grade, unadulterated.

D. Perlite: Horticultural perlite, soil amendment grade. Conforming to the National Bureau of Standards PS23.

E. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials.

G. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

H. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.6 FERTILIZER

A. All fertilizer shall be granular pills, packets or pellets with 35-80% of the total nitrogen in a slow release form.

B. All fertilizers shall be uniform in composition, free flowing and suitable for application with approved equipment. Fertilizers shall be delivered to the site fully labeled according to applicable State laws and shall bear the name, trade mark, and warranty of the producer.

C. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

D. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

E. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

F. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.7 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. Contractor shall fertilize all lawn areas with a 10-20-10 fertilizer or equivalent at the rate specified by the manufacturer. Amendments shall be added appropriately for the types of soils on site. It is the Contractor’s responsibility to have the soil acidity and a soil test conducted to establish the soil’s amendments and fertilizer rates.

2.8 MULCHES

A. Straw Mulch: Provide air-dry, clean, free of mildew and noxious weeds, and shall be small grained straw such as wheat or barley.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. A minimum of 5" of topsoil shall be spread over prepared subgrade.
2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface at a rate determined by soil test analysis, and thoroughly blend planting soil mix.
    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.
3. Spread planting soil mix to a depth required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least of 6 inches (150 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches(100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
3. Remove stones larger than 1/2 inches (38 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.

B. Sow seed at the rate of 4 lbs./1000 sq. ft. (1.8 kg/92.9 sq. m) or 170 lbs./acre.

C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 50 to 90 pounds per 1000 square feet to form a continuous blanket 1-1/2 inches (38 mm) in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment. Spread mulch uniformly so that 75-95% of the soil surface is covered.

1. Anchor straw mulch by crimping into topsoil with suitable mechanical equipment.

F. Protect seeded areas from hot, dry weather or drying winds by applying peat mulch within 24 hours after completing seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) and roll to a smooth surface.

3.5 LAWN RENOVATION

A. Renovate existing lawn.

B. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.

C. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

D. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

E. Mow, dethatch, core aerate, and rake existing lawn.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).

I. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches (100 mm) of existing soil. Provide new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch as required for new lawns.

K. Water newly planted areas and keep moist until new lawn is established.

3.6 SATISFACTORY LAWNS

A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).

B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.

C. Remove erosion-control measures after grass establishment period.

END OF SECTION 0292

Appendix A

Delaware and Raritan Canal Commission
Native Trees for Central New Jersey

The list below contains information on native trees deemed acceptable by the Commission when reviewing individual permit applications. The scientific names are linked to the corresponding "plant profile" page from the U.S. Department of Agriculture (USDA) Plants Database, (http://plants.usda.gov). National Plant Data Team, Greensboro, NC 27401-4901 USA. The USDA database contains information on the state and county distribution, and the original duration, growth habit, and native status data of vascular plants in the United States.

Scientific (Botanical) Name	Common Name(s)
Acer negundo	Box elder
Acer Rubrum	Red maple, Swamp maple, scarlet maple
Acer saccharinum	Silver maple, River maple, Creek maple
Amelanchier arborea	Common serviceberry, Downy serviceberry
Amelanchier canadensis	Canadian serviceberry, shad-blow serviceberry, shad-blow, shadbush
Betula lenta	Black birch, Sweet Birch
Betula nigra	River birch, Water birch
Betula populifolia	Gray birch
Carpinus caroliniana	Hornbeam, Musclewood
Carya cordiformis	Bitternut hickory
Carya glabra	Pignut hickory
Carya ovata	Shagbark hickory
Castanea dentata	American chestnut

Celtis occidentalis	Common hackberry
Cercis Canadensis	Eastern redbud
Cornus florida	Flowering dogwood, White dogwood
Crataegus L.	Hawthorn spp. (many are native)
Diospyros virginiana	Common persimmon, Possum-wood
Fagus grandifolia	American beech, Beechnut tree, Ridge Beech

Scientific (Botanical) Name	Common Name(s)
Fraxinus americana	White ash*
Fraxinus pennsylvanica	Green ash*
Gymnocladus dioicus	Kentucky coffeetree
Ilex opaca	American holly, Christmas holly
Juglans cinerea	Butternut, White Walnut
Juglans nigra	Black walnut
Juniperis virginiana	Eastern Red Cedar, juniper, savin
Liquidambar styraciflua	Sweet gum
Liriodendron tulipifera	Tuliptree, Tulip poplar, Yellow poplar
Magnolia virginiana	Sweetbay, Swampbay
Morus rubra	Red mulberry, Common mulberry
Nyssa sylvatica	Black gum, Black Tupelo, Pepperidge
Ostrya virginiana	Hophornbeam, Ironwood
Pinus Strobus L.	Eastern White Pine, soft pine, northern pine

Platanus occidentalis	American sycamore, Plane-tree
Populus deltoides	Eastern cottonwood
Populus grandidentata	Bigtooth aspen
Populus tremuloides	Quaking aspen
Prunus serotina	Black cherry
Prunus virginiana	Chokecherry, wild cherry, wild blackcherry, bird cherry, jamcherry
Quercus alba	White oak
Quercus bicolor	Swamp white oak
Quercus montana Willd.	Chestnut oak
Quercus rubra L.	Northern red oak
Quercus velutina Lam.	Black oak
Rhus typhina	Staghorn sumac
Robinia pseudoacacia L.	Black locust
Salix nigra	Black willow
Sassafras albidum	Sassafras
Tilia Americana	American basswood, American linden
Ulmus Americana	American elm, gray elm, soft elm
Ulmus rubra	Slippery elm, red elm

* Due to the ongoing Emerald Ash Borer infestation, permit applicants are directed not to plant White or Green ash trees until further notice. Learn more at the Division of Parks and Forestry, State Forest Service website.

Commission policy requiresthat any trees planted as part of an individual permit application shall have an 85% survivability rate over 3 years following planting. Not all the listed trees are

suitable for all locations. Applicants should carefully consider the maximum size, moisture, light requirements, growth habits, and canopy density of each species. When space is available, applicants are encouraged to promote biodiversity by planting a variety of trees. Planting a monoculture of trees limits resources for wildlife, and makes them more vulnerable to disease, pests and adverse environmental conditions.

Appendix F – Campus Cogeneration and Campus System Review Report (2019)

SMITH ENGINEERING

Engineering Study

CLIENT: TCNJ

PROJECT SITE: TCNJ, Ewing, NJ

PROJECT: Cogeneration and Campus System Review

SERVICES: Engineering Study and Analysis

REVISION: 1

Final Issue: 02.22.2019

Report Signature Log

Revati Deshpande	Date:	12.3.2018
Report Author:		
Revati Deshpande	Date:	12.3.2018
Report Analyst:		
John Rundell	Date:	2.22.2019
Technical Review:		
John Rundell	Date:	2.22.2019
Final Review:		

Report Issue Log

Issued for Client Review	Date:	12.3.2018
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Commonly-Used Abbreviations

%Sp	% Speed	**DG**	Door Grille	**HG**	Hot Gas	**PH**	Phase
°C	Degrees Celsius	**Dmd**	Demand	**HHW**	Heating Hot Water	**Po**	Position
°F	Degrees Fahrenheit	**DIA**	Diameter	**HHWP**	Heating Hot Water Pump	**Press**	Pressure
ΔT	Differential Pressure	**DP**	Differential Pressure	**HHWR**	Heating Hot Water Return	**PSI**	Pounds per Square Inch
ΔT	Differential Temperature	**Dp**	Dew Point	**HHWS**	Heating Hot Water Supply	**RA**	Return Air
A	Amps/Area	**Dpr**	Damper	**HP**	Heat Pump; Horsepower	**RAG**	Return Air Grille
AAV	Automatic Air Vent	**DTW**	Dual Temper Water	**HR**	Hour	**RAR**	Return Air Register
ABV CLG	Above Finished Ceiling	**DTWR**	Dual Temp Water Return	**HW**	Hot Water	**RD**	Round Diffuser
ACU	Air Conditioning Unit	**DTWS**	Dual Temp Water Supply	**HX**	Heat Exchanger	**ReH**	ReHeat
AFF	Above Finished Floor	**EA**	Each	**I.D.**	Inside Diameter	**RH**	Relative Humidity
AHU	Air Handling Unit	**EAT**	Entering Air Temperature	**IN.**	Inches	**RL**	Refrigerant Liquid
AP	Access Panel	**EC**	Evaporative Cooler	**IN. WG**	Inches of Water, Gauge	**RPM**	Revolutions per minute
BAS	Building Automation System	**EDH**	Electric Duct Heater	**kW**	Kilowatt	**RS**	Refrigerant Suction
BD	Balancing Damper	**EF**	Exhaust Fan	**kWh**	Kilowatt Hour	**RV**	Roof Vent
BFF	Below Finished Floor	**Eff**	Efficiency	**LAT**	Leaving Air Temperature	**SA**	Supply Air
BMS	Burner Management System	**EG**	Exhaust Grille	**LB**	Pound	**SAR**	Supply Air Register
BTU	British Thermal Units	**EH**	Exhaust Hood	**LD**	Linear Diffuser	**SD**	Smoke Damper
BTUH	BTU per hour	**EMCS**	Energy Management Control System	**LPS**	Low Pressure Steam	**SF**	Supply Fan; Square Feet
BYP	Bypass	**ER**	Exhaust Register	**LWT**	Leaving Water Temperature	**SG**	Soffit Grille
CAC	Control Air Compressor	**ESP**	External Static Pressure	**MA**	Mixed Air	**SIM**	Similar
CD	Ceiling Diffuser	**Evap**	Evaporator	**MAX**	Maximum	**SP**	Static Pressure
CFM	Cubic Feet Per Minute	**FCU**	Fan Coil Unit	**MD**	Motorized Damper	**STD**	Standard
CHW	Chilled Water	**FD**	Fire Damper	**MIN**	Minute; Minimum	**STL**	Steel
CHWP	Chilled Water Pump	**FG**	Fire Grille	**N.O.**	Normally Open	**Stm**	Steam
CHWR	Chilled Water Return	**FL DR**	Floor Drain	**NC**	Normally Closed	**TEMP**	Temperature
CHWS	Chilled Water Supply	**FPM**	Feet Per Minute	**NIC**	Not in Contract	**TG**	Transfer Grille
Cond	Condenser	**FT**	Feet	**NO.**	Number	**TSP**	Total Static Pressure
COND	Condensate	**FT WG**	Feet of Water, Gauge	**NPLV**	Nominal Part Load Value	**TYP**	Typical
CR	Cold Room	**FTU**	Fan Terminal Unit	**NPSHa**	Net Positive Suction Head Available	**UC**	Undercut Door - 3/4"
CU	Condensing Unit; Copper	**FW**	Feed Water	**NPSHr**	Net Positive Suction Head Required	**UH**	Unit Heater
CV	Coefficient of Valve	**G**	Glycol	**NTS**	Not to Scale	**V**	Valve; Volts
CW	Condenser Water	**GA**	Gauge	**OA**	Outside Air	**VAV**	Variable Air Volume
CWP	Condenser Water Pump	**GAL**	Gallons	**OAL**	Outdoor Air Louver	**VFD**	Variable Frequency Drive
CWR	Condenser Water Return	**GALV**	Galvanized	**OC**	On Center	**VFM**	Venturi Flow Meter
CWS	Condenser Water Supply	**GPH**	Gallons Per Hour	**OD**	Outside Diameter	**VVU**	Variable Volume Unit
DB	Dry-Bulb	**GPM**	Gallons Per Minute	**PF**	Power Factor	**WB**	Wet-Bulb
DDC	Direct Digital Controls	**H**	Enthalpy	**PG**	Process Glycol	**WPD**	Water Pressure Drop

1. Executive Summary

A. Subject and Purpose

TCNJ retained Smith Engineers to conduct a review of the performance and operation of the centralized cogeneration plant and the chiller system to determine if adjustments are warranted to save money, energy, or carbon emissions and reduce the energy consumption on campus. This engagement was prompted by recent data obtained from a campus-wide operations assessment, conducted by Sightlines, Inc., which indicated that the College consumes energy at rates substantially above peer institutions.

This study involved review of the operation through review of operating trends, review of manual logs, interview of operators, snap-shot readings, engineering analysis for short-term and long-term performance improvements.

B. Observations and Recommendations

The following are general conclusions from our review of the campus energy benchmarking information and load profiles:

1. Campus Energy Use: Campus energy use, when normalized for performance of the cogeneration system is higher than average (approximately 7% higher than NE Universities), In particular, the campus use of steam in the summer is higher than average (which also contributes to higher cooling consumption compared to average).
2. Likely culprit for high steam use is in buildings: We are inclined to think that the steam consumption exists within the buildings, and this could be further supported by additional building steam metering and building study and optimization efforts. Evidence for this conclusion is based on:
    a. Lack of leaks discovered by the aerial infrared study
    b. Reportedly high condensate return percentage of 70-75% per plant operators (which we were not able to confirm with trended data, but is based on interview with operations). We recommend trending make-up water use to confirm this recovery percentage.
3. Opportunity for Building Energy Reductions: Based on our review of the campus benchmark values and experience with optimization at the building level, we see an order of magnitude savings between $400,000 to $650,000 per year, representing an annual reduction of 10%-15% of annual costs. We recommend implementing a pilot project to implement building system optimization in 1-2 buildings (with existing metering) and document impact.
4. Cogen plant efficiency and comparison to Sightlines: Contrary to the Sightlines conclusion that “inefficiencies in the cogen plant could explain high consumption” we conclude that the cogeneration system is operating efficiently, and that inefficiencies in overall college systems is more attributable to the sub-systems (building energy use and chilled water plant). We

observed an electrical efficiency of 29% (compared to the sightlines observed 19%), which is in line with expected cogeneration electrical efficiency.

5. Need for Additional Energy Metering: Exact breakdown of energy use would be more accurate with additional metering and trending of key plant energy flows. Building metering would provide data to develop comprehensive energy roadmap. We recommend expansion of the existing building metering system and consolidation of the metering data into a single information repository.
6. High use of Boilers rather than HRSG: the summer steam is excessively met by the boilers rather than the unfired and fired HRSG, which is a cheaper means of producing steam both because of its improved efficiency compared to the boilers and in substantially reduced natural gas fuel rate. The average summer steam load of 30,000 pounds per hour, based on the rated capacity of the HRSG, should be able to be met for the majority of the summer and most of the shoulder seasons without boiler operation
7. Little summer day/night/weekend steam load variation: There is no reduction in the load for nighttime or weekend periods observed from the hourly steam profiles. One interpretation of this data is that the campus has minimal use of night setbacks, which should be apparent from the trends.
8. Turbine inlet air cooling control valve disconnected: We recommend re-connecting the control valve actuator to maintain a setpoint for the inlet air cooling coil leaving air temperature.
9. Spray Cooling of Turbine Inlet Gas Overcooling: Inlet gas cooling to gas turbines is only necessary to protect the turbine, and is not an energy conservation measure. We recommend further study to identify the design parameters and operating to this temperature, saving energy and water
10. Plant steam relief vent valve not trended, and possible source of steam loss: We recommend trending the position of the steam vent to confirm that it is not frequently opened except during periods of high load swings
11. Chilled water plant upgrade project requires close-out. The chilled water plant upgrade project was not fully closed out during our survey and we presume the controls deficiencies observed will be corrected during the close-out process.
12. NJ Clean Energy Large Energy User Program Participation: One of the rebate programs which we have had success with for gathering funds for similar campuses in New Jersey is the LEUP, which funds: 75% of project cost, $0.33/kwh, $3.75/therm. Recommend further study to quantify opportunities.
13. Economic and Emergency Demand Response Programs: TCNJ typically maintains an import buffer of electricity from 0.5 to 1.5 MW. We recommend further evaluating participation in PJM Economic and/or Emergency Demand Response programs and reducing the electric import buffer by increasing operation of cogen, load shedding building energy, and/or transitioning to steam chillers. Recommend further study to quantify opportunities.

C. Analysis of Recommendation

The following is a summary of the measures which were further analyzed to quantify savings:

Measure 1: Maximize use of Duct Firing:

This measure quantifies the benefit of transitioning summer steam generation from boilers to fired HRSG. The HRSG is a much more cost-effective producer of steam than the boilers for two reasons:

1) The gas purchased for Cogen is cheaper than the gas purchased for the boiler
2) The HRSG is more than 95% efficient compared to the boilers which are 85-87% efficient

Measure 2: Reduce Summer Steam Use

This measure quantifies the benefit of reducing 11.5mmbtu/h of summer steam use, which we believe to be achievable with further investigation into the building use.

Measure 3: Increase Usage of Steam Chiller (Only when duct firing)

This measure analyzes the economics of generation of chilled water using the steam chiller vs the electric chiller. We conclude that:

1) Operation of the steam chiller is more cost-effective than the electric chiller when:
    - Steam is generated by fired or unfired HRS G, and
    - Transition from the electric chiller to the steam chiller does not result in the Cogen electric production being ramped back due to the need to maintain an importation buffer of electricity
    - OR, if operation of the steam chiller is dictated by future participation in a demand response program
2) Operation of the steam chiller is not more cost-effective than the electric chiller in all other scenarios

Based on our review of the general operating parameters of the electric production and importation of electricity from the grid it appears that transition from electric chiller to steam chiller would reduce the Cogen power production, and the summer steam that is frequently made by boilers, the electric chiller is likely to continue to be the more cost-effective chiller for much of the cooling season.

Should the site successfully implement Measure 1 (Maximize use of Duct Firing), we recommend further study into the economics of reducing the importation buffer such that additional electricity could be generated by the Cogen even when the cooling is transitioned from an electric chiller to a steam chiller.

Measure 4: Increase Compressed Gas Temperature

This measure quantifies the benefit of saving by increasing the natural gas temperature setpoint. It is important to note that further study is needed to confirm operating limits for the turbine before increasing any setpoints or operating practice.

Measure 5: Building Optimization

This measure quantifies the approximated benefit of a comprehensive building system optimization project. Based on experience with similar institutions, a reduction of annual energy spend of 10% to 15% is reasonable approximation of opportunity.

Table 1 –Financial summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 1: Maximize use of Duct Firing	NA	NA	NA	12,473	$ 280,000	1,020	$ 280,000	Cost savings comes from both improvement in efficiency (mmbtu savings) and cost savings for reduced gas rate with HRSG gas.
Measure 2: Reduce Summer Steam use:	NA	NA	NA	41,702	$ 274,402	3,411	$ 274,402	Presumes April thru August steam use reduced by an average of 11.5 mmbtu/h
Measure 3: Increase Usage of Steam Chiller (Only when duct firing)	1,897,500	825	$ 182,380	-32,684	$ (142,830)	-1,938	$ 39,550	Only when duct firing, and if transitioning to steam chiller does not reduce CHP elec production
Measure 4: Increase Compressed Gas Temperature				1,018	$ 4,451	83	$ 4,451	Assumes average temperature increase of 70 degF. Requires further study to confirm upper limit.
Measure 5: Building Optimizaiton	Opportunity for building savings is $450,000 to $650,000 per year							

2. Introduction

A. Subject and Purpose

This report presents the preliminary findings of a Smith Engineering study commissioned by The College of New Jersey to perform a Cogen Forensic and Operations Analysis of the system located at the TCNJ campus in Ewing, NJ.

B. Scope of Work

The following outlines the scope of work that was performed to produce this report.

Task 1 - Collect and Review Drawings, Reports and Data

A. Gather existing system information from TCNJ including:
    1. Previous reports
    2. Existing design drawings, P&IDs, sequences of operation
    3. Available data (we will work with TCNJ staff to identify a selection of data which will be useful to our analysis)
    4. Utility Bills for electricity and fuels
    5. Energy and Utilities central budget tracking system
B. Process the data into useable time-series format
C. Review all documentation to become familiar with original design intent, previous operations from prior studies, observed operation and interaction of hydronics and thermodynamics from data trends.

Task 2 - Detailed Operational Survey

A. Participate in Kick-Off meeting with TCNJ personnel to review project objectives, discuss preliminary observations
B. Interview plant operations to understand interaction of automated sequences with manual operations such as equipment staging, temperature, flow and pressure setpoint resets, dispatching decision process for the various assets, etc.
C. Perform detailed review of operating dynamics, working with plant personnel to take pressure and temperature readings to confirm hydraulic and thermodynamic "snap-shot" operation assumptions.
D. Review the operation of the cogeneration plant and boiler plant to understand incorporation of optimized practices, applications of throttling, mixing, temperature resets, pumping strategies, feedwater control, system pressurization control, dispatching of heat recovery, duct firing, etc.
E. Review the performance of chilled water plant and incorporation of basic optimization strategies including optimal use of cooling towers, condenser water resets, chiller

performance (approach temperatures, pressures, fouling), chiller staging, pump staging, turbine slow-roll process, turbine hand valve throttle control, etc.

Task 3 - Analysis

A. Utilize a combination of trended data and observed dynamics to analyze the operation of the systems.
B. Generate annual load profiles for the various pertinent plant and campus loads, flows, temperatures, pressures, hydronic system curves, load duration curves, delta T curves.
C. Analyze the coincident interaction of the plant and campus energy dynamics including
    1. Total campus electric load
    2. Imported electricity
    3. Cogeneration produced electricity
    4. Coincident campus thermal load for cooling and heating
    5. Use of fired and unfired steam
    6. Balance of use of steam and electric chillers as it relates to coincident cogeneration output and available capacity
D. Develop a model for the utility structure of the campus to analyze all measures
E. Develop Energy Conservation Measures
        a. Operational measures and controls sequence measures
        b. Capital measures

Task 4 - Findings and Draft Recommendations

A. Provide progress presentation to TCNJ personnel to describe draft recommendations for discussion.
B. Identify major assumptions and basis for analysis inputs
C. Present results of analysis
D. Incorporate feedback from TCNJ staff
E. Update analysis accordingly

Task 5 - Documentation of Final Recommendations

A. Generate comprehensive report including description of field observations, description of all basis of assumptions including utilization of data, load profile analysis, description of analysis methodology, findings and recommendations:

C. Data Basis of Analysis

The following is the primary source of data for our analysis:

Utility Data

a. Boiler Gas (2017)
b. Cogen Gas (2017)
c. Grid Elec (2017)

Trend Data

d. Total Plant Steam production (hourly)

Other data

e. Sightlines prior year data (2010, 2013)
f. Operator logs

Calculated/assumed

g. Assumed campus cooling load
h. Assumed balance of steam and elec chillers
i. Calculated elec efficiency
j. Assumed condensate return
k. Assumed steam turbine and elec chiller performance

3. Utility Data Analysis

A. Utility Usage and Cost

Utility bill information was provided and is shown in tables below. This data is used in analyses to calculate the cost associated with the system modifications.

i. Electric Energy Usage

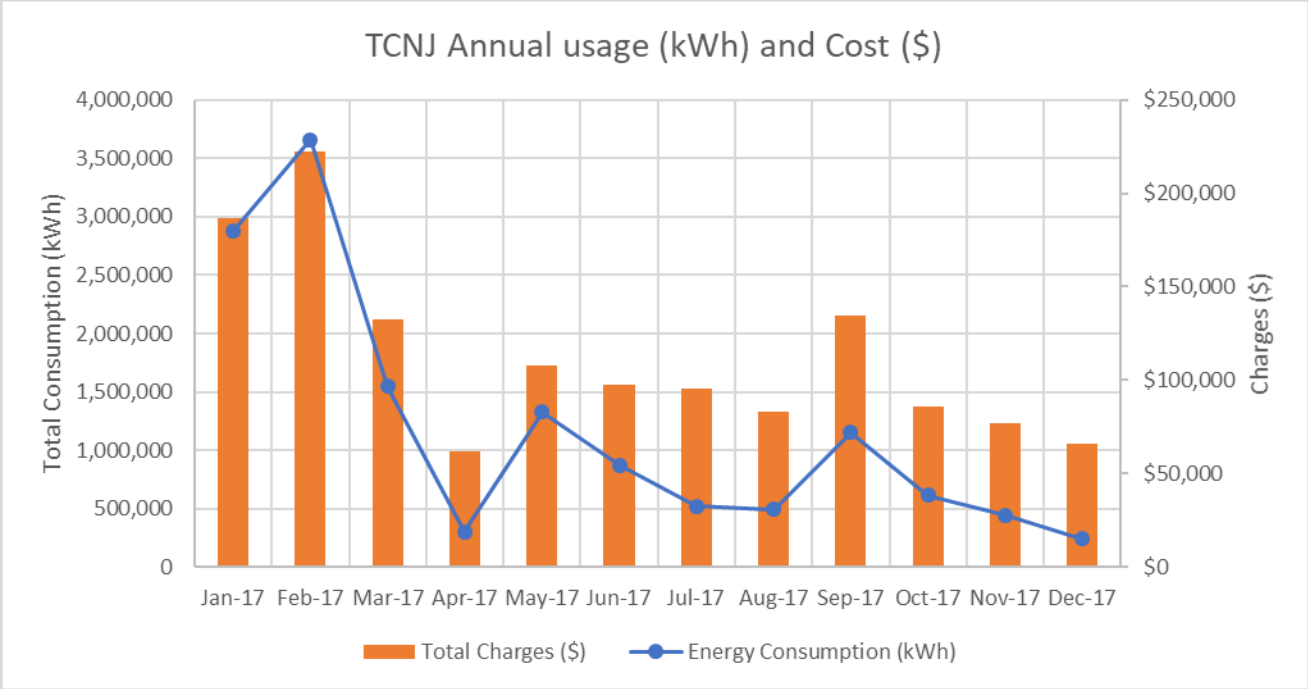
Below are a table and a graph of monthly electrical costs for the building from Jan 2017 – Dec 2017

It is important to note that the cogeneration system was not operating during January and February of 2017. We do not assume this to be the normal operation practice. The cogeneration system is generally base loaded to maintain a relatively fixed import buffer of electricity form the grid, as described later in this report.

Table 2 – Electric Energy Usage & Cost

Acc No: 4200390809															
				Delivery					Supply						
Month	Total Energy	Annual Peak Demand	Summer Demand	Net Energy Charge	Summer Demand Charges	Annual Demand Charge	Net Demand Charge	Total Delivery Charge	Demand Gener-ation	Demand Trans-mission	Gener-ation Charge	Trans-mission Charge	Energy Supply Charge	Net Supply Charge	Net Electricity Charge
	kWh	kW	kW	$	$	$	$	$	kW	kW	$	$	$	$	
Jan-17	2,880,371	6,320		$25,703		$7,059	$7,059	$34,805	2,316	1,931	$25,281	$14,381	$112,109	$151,771	**$186,576**
Feb-17	3,657,128	6,320		$32,635		$7,058	$7,058	$41,735	2,316	1,931	$25,273	$16,053	$139,241	$180,567	**$222,302**
Mar-17	1,545,370	6,320		$13,791		$7,147	$7,147	$22,980	2,316	1,931	$25,273	$16,294	$67,841	$109,408	**$132,388**
Apr-17	301,793	6,320		$2,692		$7,147	$7,147	$11,881	2,316	1,931	$25,273	$16,294	$8,812	$50,379	**$62,260**
May-17	1,329,469	6,320		$11,643		$7,147	$7,147	$20,832	2,316	1,931	$25,273	$16,453	$45,130	$86,856	**$107,688**
Jun-17	872,186	7,147	1,509	$7,635	$6,170	$7,147	$13,317	$22,994	3,165	1,931	$28,394	$16,436	$29,482	$74,312	**$97,306**
Jul-17	521,674	6,320	2,336	$4,562	$9,553	$7,147	$16,700	$23,304	3,165	1,931	$28,506	$16,463	$27,372	$72,341	**$95,645**
Aug-17	493,327	6,119	2,025	$4,314	$8,282	$6,919	$15,201	$21,557	3,165	1,931	$28,506	$16,463	$16,462	$61,431	**$82,988**
Sep-17	1,152,599	7,029	3,196	$10,183	$13,259	$8,036	$21,295	$33,520	3,165	1,931	$28,506	$16,351	$55,924	$100,781	**$134,301**
Oct-17	614,019	7,029		$5,150		$8,076	$8,076	$15,268	3,150	1,931	$28,388	$16,539	$25,644	$70,571	**$85,839**
Nov-17	443,815	7,029		$3,699		$8,076	$8,076	$13,817	3,150	1,931	$28,374	$16,539	$18,532	$63,445	**$77,262**
Dec-17	244,024	14,058		$2,042		$7,807	$7,807	$11,823	3,045	1,866	$27,429	$15,988	$11,030	$54,447	**$66,270**
Total or Avg	**14,055,775**	**7,194**	**2,267**	**$124,049**	**$37,264**	**$88,766**	**$126,030**	**$274,516**	**2,799**	**1,926**	**$324,476**	**$194,254**	**$557,579**	**$1,076,309**	**$1,350,825**

Graph 1 – Electric Usage and Cost



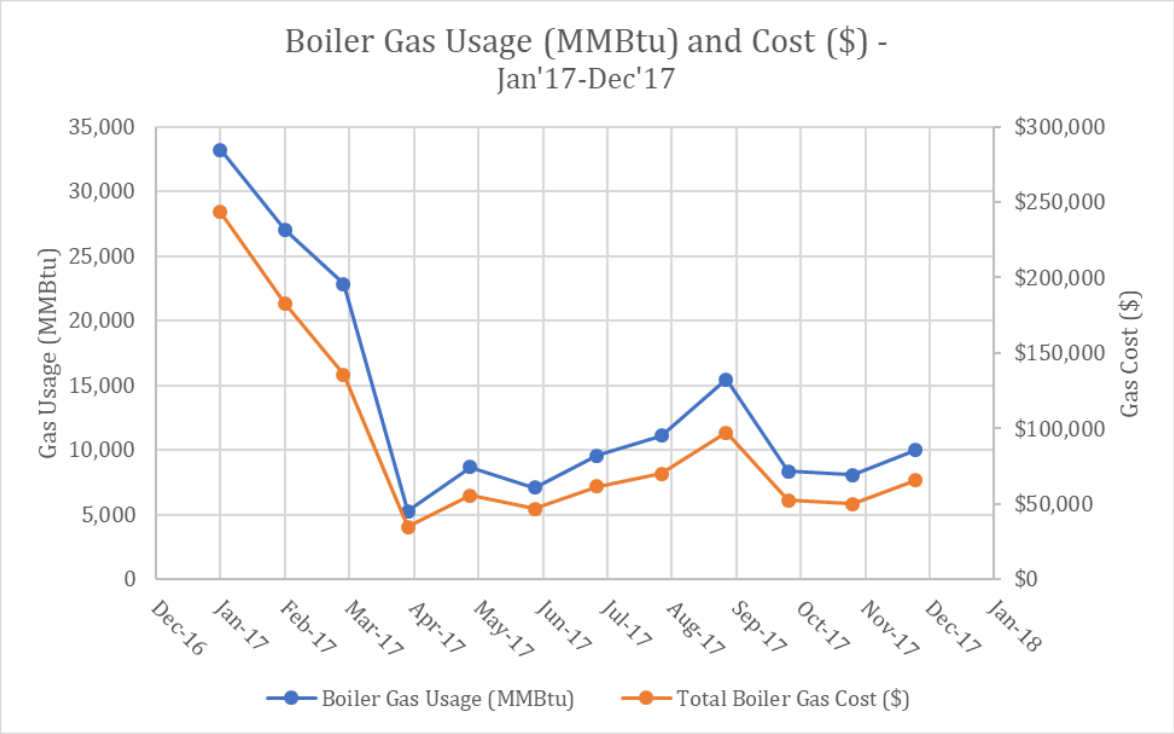
B. Gas Usage

Below are a table and a graph of annual gas costs for the building from Jan2017 – Dec 2017 for the boilers.

Table 3 – Boiler Gas Use & Cost

Boiler Gas					
Month	**Gas Usage**	**Gas usage**	**Delivery Cost**	**Supply Cost**	**Total Cost**
	Therms	**MMBTU**	**$**	**$**	**$**
Jan-17	332,327	33,233	$43,494	$199,905	$243,399
Feb-17	270,702	27,070	$35,537	$147,453	$182,990
Mar-17	228,282	22,828	$30,061	$105,614	$135,675
Apr-17	52,526	5,253	$7,369	$27,336	$34,705
May-17	86,650	8,665	$11,775	$43,955	$55,730
Jun-17	70,815	7,082	$9,730	$37,082	$46,812
Jul-17	95,724	9,572	$13,060	$48,363	$61,423
Aug-17	111,310	11,131	$15,137	$55,048	$70,185
Sep-17	154,562	15,456	$20,974	$76,304	$97,278
Oct-17	83,294	8,329	$11,246	$41,238	$52,484
Nov-17	80,742	8,074	$10,919	$38,883	$49,802
Dec-17	99,718	9,972	$13,347	$52,190	$65,537
Total	**1,666,652**	**166,665**	**$222,649**	**$873,371**	**$1,096,020**

Graph 2 – Boiler Gas Usage and Cost

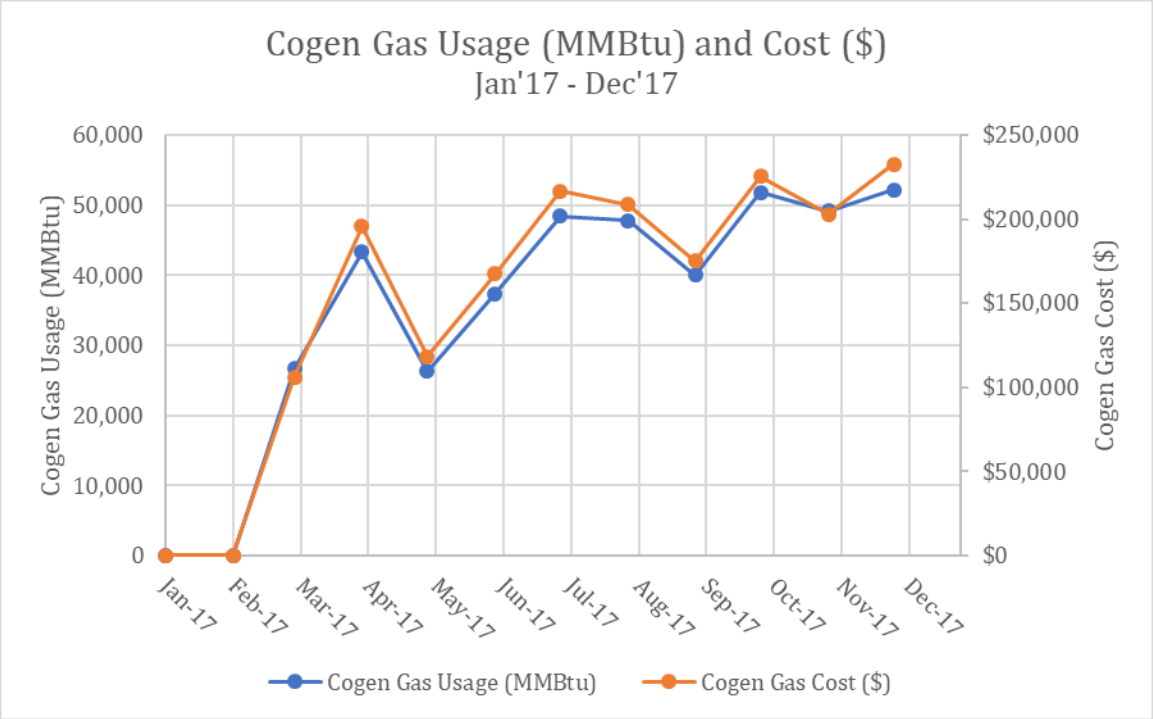


Below are a table and a graph of annual gas costs for the building from Jan2017 – Dec 2017 for the boilers.

Table 4 – Cogen Gas Use & Cost

Cogen Gas					
	Gas Usage	Gas Usage	Delivery Cost	Supply Cost	Total Cost
Month	**Therms**	**MMBtu**	**$**	**$**	**$**
Jan-17	0	0	$142	$0	$142
Feb-17	0	0	$142	$0	$142
Mar-17	266,838	26,684	$30,351	$75,688	$106,039
Apr-17	433,188	43,319	$49,185	$146,666	$195,851
May-17	263,437	26,344	$29,966	$88,320	$118,286
Jun-17	373,699	37,370	$42,707	$124,665	$167,372
Jul-17	483,960	48,396	$55,447	$161,010	$216,457
Aug-17	477,804	47,780	$54,953	$153,642	$208,595
Sep-17	399,679	39,968	$46,428	$128,609	$175,037
Oct-17	517,713	51,771	$58,182	$167,325	$225,507
Nov-17	491,519	49,152	$55,246	$147,602	$202,848
Dec-17	521,347	52,135	$58,590	$173,833	$232,423
Total	**4,229,184**	**422,918**	**$481,339**	**$1,367,360**	**$1,848,699**

Graph 3 – Cogen Gas Usage and Cost



C. Blended Utility Rates

The following is the blended utility rates for natural gas and the equivalent rate of electrical production (without considering the economic benefit of the recovered thermal energy).

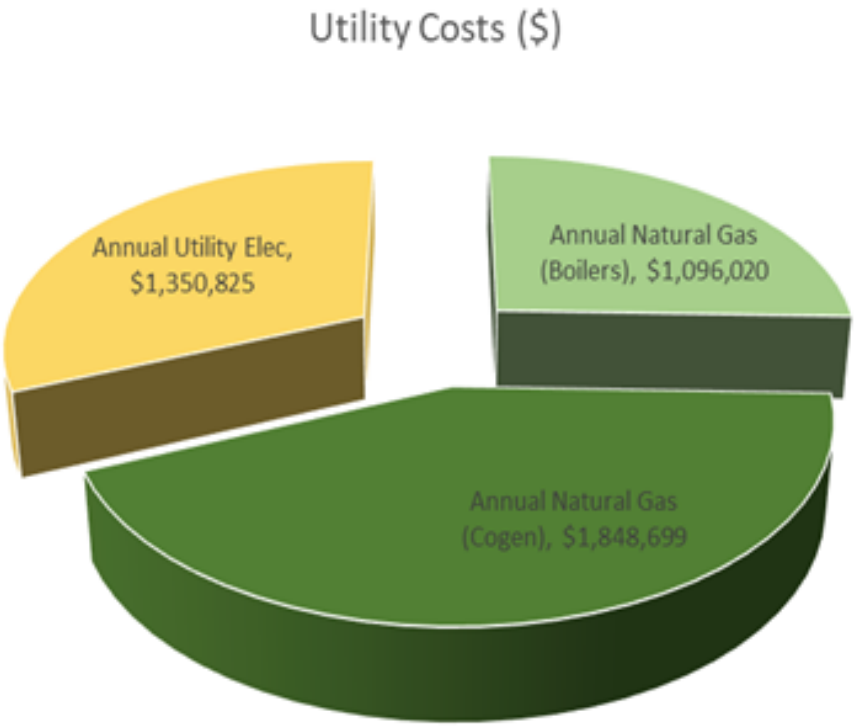
Table 5 –Fuel and electric rate breakdown

Fuel and Elec Rates (2017)				
Boiler Gas Rate	$ 6.58	$/mmbtu		
Cogen Gas Rate	$ 4.37	$/mmbtu		
Equivalent Cogen Elec Rate	$ 15.07	$/mmbtu	$ 0.051	$/kwh
Purchased Elec Rate	$ 28.17	$/mmbtu	$ 0.096	$/kwh

It is important to observe that the natural gas purchased for the gas turbine and supplemental duct firing is at a lower rate than the gas purchased for boiler firing, as described in the above table.

The following is a graphical representation of the annual spend on the various electric and fuel components.

Graph 4 – Breakdown of utility and fuel costs



4. Existing Infrastructure

Site

The College of New Jersey (TCNJ), established in 1855, is spread over 289 acres and consists of over 35 academic and housing buildings. This analysis focusses on the Cogen System with a 5.2 MW gas turbine.

The campus has seen expansion in the square footage with the addition of a STEM building. The following is a summary of recent changes to the campus GSF (which excludes unheated areas such as parking garage)

- 2014, 2015, 2016: 2,622,872 GSF
- 2017(STEM & BSC Addition): 2,745,682 GSF

Image 1 – Site Image

The 2017 gross square footage is used as the primary basis for this report's benchmarking.

The following is a list of the individual building square footages.

Table 6 –Building Summary

Year	Bldg Code	Building Name	GSF	Consumers of HVAC
Pre-2010	AD	Administrative Services Bldg	32,339	32,339
Pre-2010	AG	Armstrong Garage	36,000	
Pre-2010	AL	Allen/Brewster/Ely Hall	49,096	49,096
Pre-2010	AR	Armstrong Hall	71,647	71,647
Pre-2010	AT	Art and IMM Building	70,580	70,580
Pre-2010	BA	Bliss Annex	20,667	20,667
Pre-2010	BI	Biology Building	77,893	77,893
Pre-2010	BL	Bliss Hall	35,915	35,915
Pre-2010	BU	Business, School of	46,000	46,000
Pre-2010	BW	Brower Student Center	90,000	90,000
Pre-2010	CE	Centennial Hall	49,944	49,944
Pre-2010	CH	Chapel	4,450	4,450
Pre-2010	CR	Cromwell Hall	85,847	85,847
Pre-2010	DE	Decker Hall	95,538	95,538
Pre-2010	ED	Education Building	79,885	79,885
Pre-2010	EI	Eickhoff Hall	147,100	147,100
Pre-2010	FG	Forcina Garage	50,753	
Pre-2010	FO	Forcina Hall	77,380	77,380
Pre-2010	GR	Green Hall	71,808	71,808
Pre-2010	GS	Green Lane Storage Facili		
Pre-2010	KE	Kendall Hall	83,000	83,000
Pre-2010	LB	New Library	153,515	153,515
Pre-2010	MN	Facilities Maint. Bldg	21,049	21,049
Pre-2010	MU	Music Building	50,200	50,200
Pre-2010	NE	New Residence Hall	57,875	57,875
Pre-2010	NO	Norsworthy Hall	43,200	43,200
Pre-2010	PA	Packer Hall	69,519	69,519
Pre-2010	PG	Metzger Drive Parking Gar	340,000	
Pre-2010	PO	Power House / Cogen	15,720	15,720
Pre-2010	RE	Athletic Recreation Center	53,861	53,861
Pre-2010	SC	Science Complex	123,068	123,068
Pre-2010	SG	Decker Garage	264,239	
Pre-2010	SO	Social Sciences	74,000	74,000
Pre-2010	TG	TW Parking Garage	112,692	
Pre-2010	TH	Trenton Hall	33,097	33,097
Pre-2010	TO	Travers/Wolfe	280,494	280,494
Pre-2010	TS	Townhouses South	65,000	65,000
Pre-2010	TW	Townhouses West & East	133,749	133,749
Pre-2010	WE34	Roscoe L. West - '34	39,416	39,416
Pre-2010	WE68	Roscoe L. West - '68	59,140	59,140
Pre-2010	WH	William Hausdoerffer Hall	70,000	70,000
Pre-2010	WP	William Phelps Hall	70,000	70,000
Pre-2010		Holman Hall	86,609	86,609
Pre-2010		Lions Stadium Concession	2,050	2,050
Pre-2010		lions Stadium Restrooms	1,510	1,510
Pre-2010		Lions Stadium Pressbox	2,548	2,548
Pre-2010	TH	Trenton Info Booth	56	56
Pre-2010		Soccer Bathrooms	912	912
Pre-2010		Soccer Pressbox	484	484
Pre-2010		Softball Concession	321	321
Pre-2010		Softball Pressbox	725	725
Pre-2010		Softball Shed	291	
Pre-2010		Track Storage	331	
Pre-2010		Ackerman	500	
2015		Police Bicycle Shed	100	
2017		STEM Building / Forum	106,380	106,380
2017		BSC Addition	16,430	16,430
2017		Chem Addition	29,681	29,681
2018		Lions Stadium Storage	1,824	
Totals			3,656,427	2,849,698

Boiler/Cogen

The cogeneration and boiler plant is generally comprised of the following major equipment components

- Boiler #1: 41,400 PPH
- Boiler #2: 40,000 PPH
- 5.2MW Solar Turbine (Solar Taurus 60)
- Cogen HRSG: 43,000 PPH (28,000 Unfired, +15,000 firing gas only duct burner)

Appendix A lists additional design information for specific plant components.

CHW Plant

The chilled water plant is generally comprised of the following major equipment components.

- Chiller #1: 2,000 Ton centrifugal steam chiller (18,000 PPH)
- Chiller #2: 2,000 Ton centrifugal steam chiller (18,000 PPH)
- Chiller #3: 1,500 Ton Electric VFD chiller
- Chiller #5: 1,200 Ton Electric chiller

Appendix a lists additional design information for specific plant components.

Control of the Cogeneration Plant

The general operation of the cogeneration plant is to produce electricity at a rate such that there is a small importation of power from the grid which is less than 1 MW. The stated objective of the operators for production of steam is to supplement the campus steam load first with duct firing and then with boilers; although, the observed operation based off of the trends appears to differ from this at times, as further described within this report, with partial firing of the duct burner and utilization of the boilers for much of the campus steam load (which is more expensive to produce both because the boilers are less efficient and also because the boiler gas is more expensive).

Control of the Chilled Water Plant

The chilled water plant was recently upgraded with new cooling towers and control systems. We observed a number of controls deficiencies associated with the chilled water plant, as described within this report, which can be attributed to the commissioning of the plant not being finalized. Historically, the plant operators manually turn on and off chilled water components such as dispatching of steam and electric chillers. The historical operation of the chilled water plant is not observable from controls trends, so our analysis makes assumptions based on equipment nameplates data and observed snapshots of the operation.

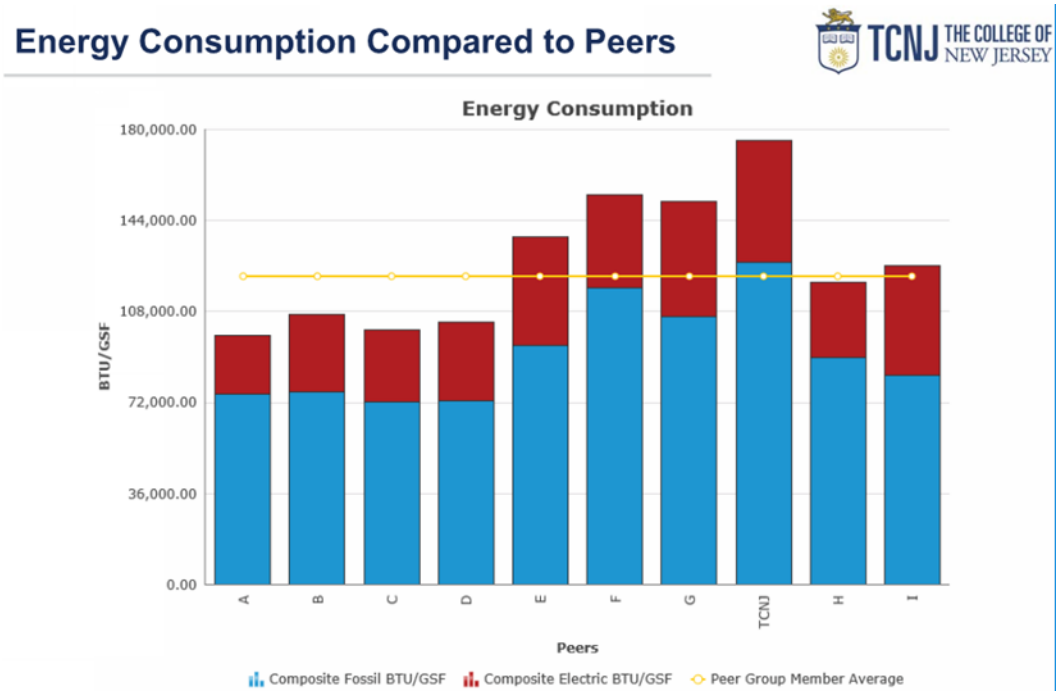
5. Energy Benchmarking and Load Profile Analysis

One objective of this study is to understand the campus energy density, annual load profile, central plant performance, and other high level key performance indicators as they compare to other similar institutions. One of the challenges of this process is utilizing the available data available to TCNJ, and normalizing the various performance indicators for the operation of the cogeneration system. Compared to peer institutions TCNJ does not have high availability of interval data or visibility into the production or performance of the subsystems. The following is a description of our process for analyzing the performance of the campus systems and a comparison of our analysis results for the TCNJ campus relative to other institutions.

Previous Sightlines Report and Energy Density (KBTU/GSF)

A common method for benchmarking the energy density of a campus is with a unit of energy called EUI (Energy Utilization Index). This metric takes the combined energy usage from all energy sources and converts them to a common energy unit per gross square footage of campus served. The previous Sightlines report showed a combined energy utilization index of approximately 175Kbut/GSF, of which 50 kbtu/GSF was electric and 125kbtu/GSF was fossil. The following is an excerpt from the sightlines report showing this comparison and identifying TCNJ as a high energy user.

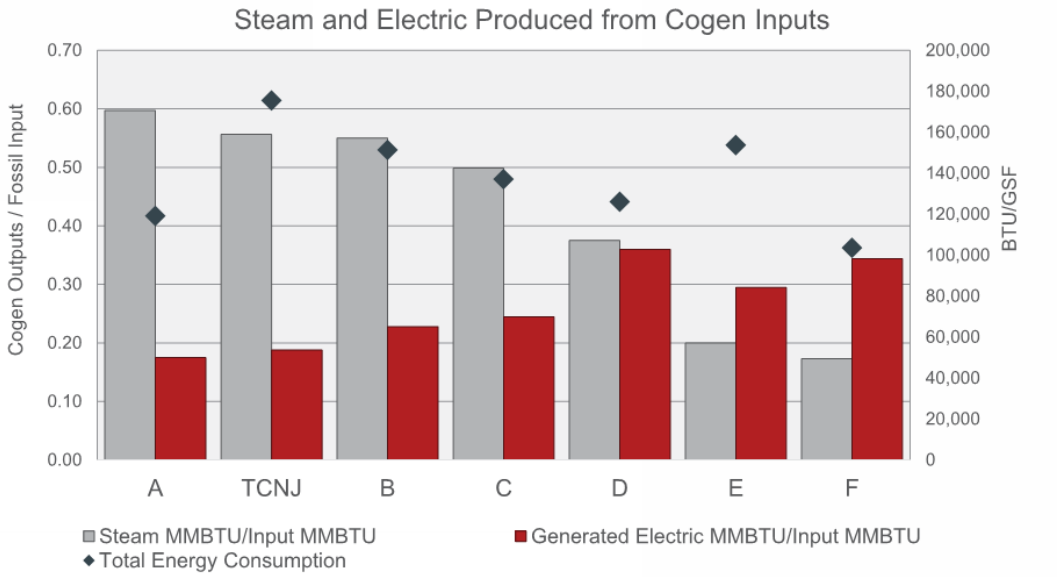
Graph 5 – Previous Sightlines energy consumption comparisons



Cogen Produces More Steam, Less Electricity

TCNJ THE COLLEGE OF NEW JERSEY

Inefficiencies in cogen plant could explain high consumption



Our observation on this report are

1) The electric and thermal efficiencies do not match with our analysis. **We observed an electrical efficiency of 29% (compared to the sightlines observed 19%).** The sightlines 55% thermal efficiency observed only makes sense if it is a combination of fired HRSG, unfired HRSG and boiler performance, in which case it is not as useful of a metric in understanding plant performance. The presumed unfired HRSG efficiency should be between 30-40%, the fired HRSG efficiency >90% and the boiler efficiency 85-88% efficient. The balance of use of these assets would determine the overall plant thermal efficiency.
2) Rather than the Sightline's conclusion that "inefficiencies in the Cogen plant could explain high consumption" we conclude that the cogeneration system is operating efficiently, and that inefficiencies in overall college systems is more attributable to the sub-systems (building energy use and chilled water plant). The later contents of this report provide additional information and rationale for this conclusion.

Site Energy Use (Non-Normalized)

By taking the metered data for the boiler gas consumption, the Cogen gas consumption and the electrical consumption from the grid and converting to a common energy unit we can see the site's total non-normalized energy utilization index below. This does not take into account the efficiency of the cogeneration plant.

Table 7 – Non-normalized site total Energy Use Index (EUI)

Site Kbtu/sf (Non-Normalized)				
Annual Natural Gas (Boilers)	166,665	mmbtu	61	kbtu/sf
Annual Natural Gas (Cogen)	422,918	mmbtu	154	kbtu/sf
Annual Utility Elec	42,167	mmbtu	15	kbtu/sf
		Total	230	kbtu/sf

Site Energy Use (Normalized for Cogeneration) and Comparison to CBECS

In order to make use of the site energy utilization index figure we must break down the individual efficiencies and energy flows for the cogeneration plant, and subtract them from this metric to evaluate the energy efficiency of the campus. This figure can then be used to compare to other campuses and peer institutions. The following assumptions were made to derive the normalized energy benchmark for the campus consumption, as well as other observations on the general operating trends and profiles for the plants.

Data sources and calculated values used for the analysis:

- Actual utility data used to determine fuel and electric consumption monthly profiles
  - Boiler Gas (2017)
  - Cogen Gas (2017)
  - Grid Elec (2017)
- Trend Data use to determine campus steam consumption (including consumption of steam chillers)
  - Total Plant Steam production (hourly)
- Calculated/Assumed
  - Assumed campus cooling load
  - Assumed balance of steam and elec chillers
  - Calculated electrical efficiency
  - Assumed condensate return

Assumptions for normalization of the cogeneration plant:

- We developed an annual profile for the campus which resulted in a total cooling load of 5.8M Ton-hrs of campus chilled water load
- The analysis assumed that approximately ~50% of cooling load met by steam chiller.
- 85% average boiler efficiency
- 9 lb/ton steam chiller average efficiency
- 29% Cogen elec efficiency

A national program known as CBECS (Commercial building energy consumption survey) is a tool used for benchmarking energy consumption of buildings and campus. CBECS surveys and categorizes various building types by usage and region. There is a specific category for "North Eastern Colleges and Universities". This tool can only be used after normalizing for performance of

the cogeneration plant, assuming the campus were an exclusively grid-connected, all electric chilled water plant. Comparing the CBECS data to TCNJ shows the following:

Table 8 – Normalized Site Energy Utilization Index (EUI)

		CBECS Energy Breakdown for North East University		TCNJ Breakdown	% Above CBECS
		kbtu/sf		kbtu/sf	
Heating		92.6		98.8	107%
Cooling		10.5		14.7	140%
Electricity (Non Cooling)	Fans	15.5	56.4	56.9	101%
	Water Heating	7.4			
	Lighting	20			
	Cooking	0			
	Refrigeration	0.7			
	Office Equipment	0.9			
	Computer	4.7			
	Miscellaneous	7.2			
		159.5		170.4	107%

Note: The TCNJ Breakdown data comes from the data listed in Table 9

From this analysis we can see that when normalized for performance of the cogeneration system, TCNJ energy density is higher than average (approximately 7% higher than NE Universities), In particular, the campus use of steam in the summer is higher than average (which also contributes to higher cooling consumption compared to average).

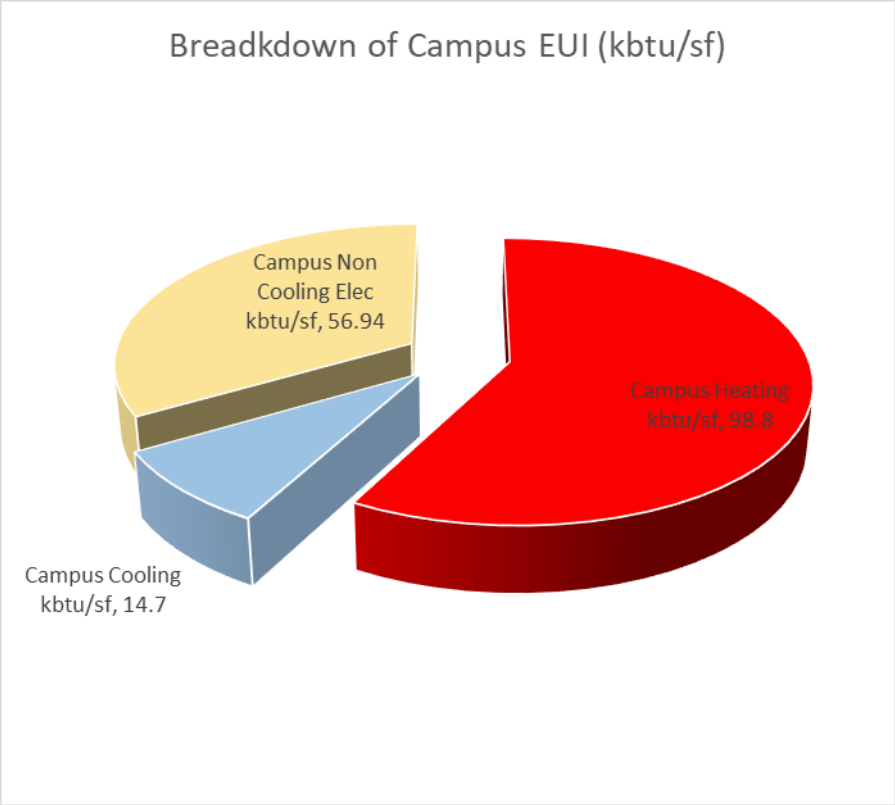
The analysis process and monthly totals is shown below.

Table 9 – Overview of monthly consumption/production of central plant

Month	Total Steam Produced (Trended Data)	Boiler Gas Usage (Utility Bills)	Cogen + DB Gas Usage (Utility Bills)	Boiler Steam Generated (Approximated based on boiler efficiecny)	Cogen +Duct Burner Steam Generated (Calculated)	TCNJ Chilled water monthly cooling load (Estimated)	Steam Chiller Ton-hrs (Esti)	Elec Chiller Load (Calculated)	Steam provided to steam chillers (Esti)	Steam provided to steam chillers (Calculated)	Campus Heating Load (Calculated)	Electricity from Cogen (Calculated)	Electricity Utility (Utility Bills)	Total Electricity Used by Campus (Calculated)
	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	Ton-Hrs	MMBtu	lbs	MMBtu	MMBtu	MMBtu	kWh	MMBtu
Jan-17	31,859	33,233	0	28,580	3,279	0	0	0	0	0	31,859	0	2,880,371	8,641
Feb-17	25,724	27,070	0	23,280	2,444	0	0	0	0	0	25,724	0	3,657,128	10,971
Mar-17	28,155	22,828	26,684	19,632	8,523	2,203	91,805	1,102	826,246	826	27,329	7,738	1,545,370	12,374
Apr-17	18,438	5,253	43,319	4,517	13,921	5,634	234,743	2,817	2,112,691	2,113	16,325	12,562	301,793	13,468
May-17	18,848	8,665	26,344	7,452	11,396	7,140	297,510	3,570	2,677,590	2,678	16,170	7,640	1,329,469	11,628
Jun-17	21,318	7,082	37,370	6,090	15,228	13,273	553,055	6,637	4,977,495	4,977	16,340	10,837	872,186	13,454
Jul-17	23,286	9,572	48,396	8,232	15,053	16,176	673,997	8,088	6,065,976	6,066	17,220	14,035	521,674	15,600
Aug-17	22,546	11,131	47,780	9,573	12,974	16,364	681,849	8,182	6,136,645	6,137	16,410	13,856	493,327	15,336
Sep-17	21,987	15,456	39,968	13,292	8,694	13,788	574,515	6,894	5,170,638	5,171	16,816	11,591	1,152,599	15,048
Oct-17	25,856	8,329	51,771	7,163	18,693	10,481	436,694	5,240	3,930,249	3,930	21,926	15,014	614,019	16,856
Nov-17	28,493	8,074	49,152	6,944	21,549	0	0	0	0	0	28,493	14,254	443,815	15,585
Dec-17	36,625	9,972	52,135	8,576	28,049	0	0	0	0	0	36,625	15,119	244,024	15,851
Total	**303,135**	**166,665**	**422,918**	**143,332**	**159,803**	**85,060**	**3,544,170**	**42,530**	**31,897,529**	**31,898**	**271,238**	**122,646**	**14,055,775**	**164,814**

The results of the breakdown are shown below, which assumes that 50% of the campus chilled water is provided by the steam driven chillers.

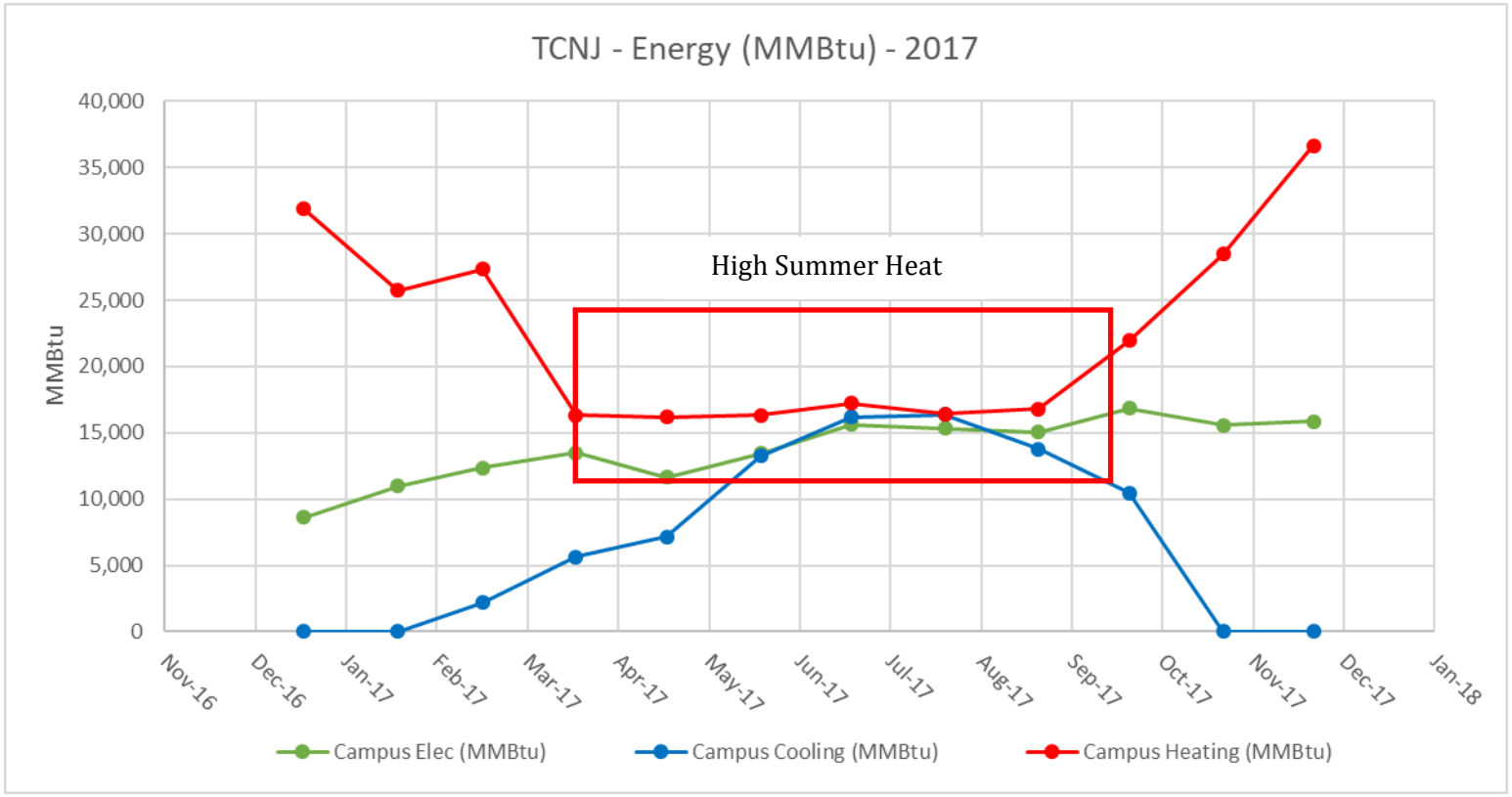
Graph 6 – Annual breakdown of campus Energy Utilization Index (EUI)



Campus Annual Load Profile Analysis

Based on the above described monthly analysis and breakdown of energy streams we can develop an annual profile for the campus electrical load, campus cooling load, and campus heating load.

Graph 7 – Profile for monthly total heating, cooling and electric consumption

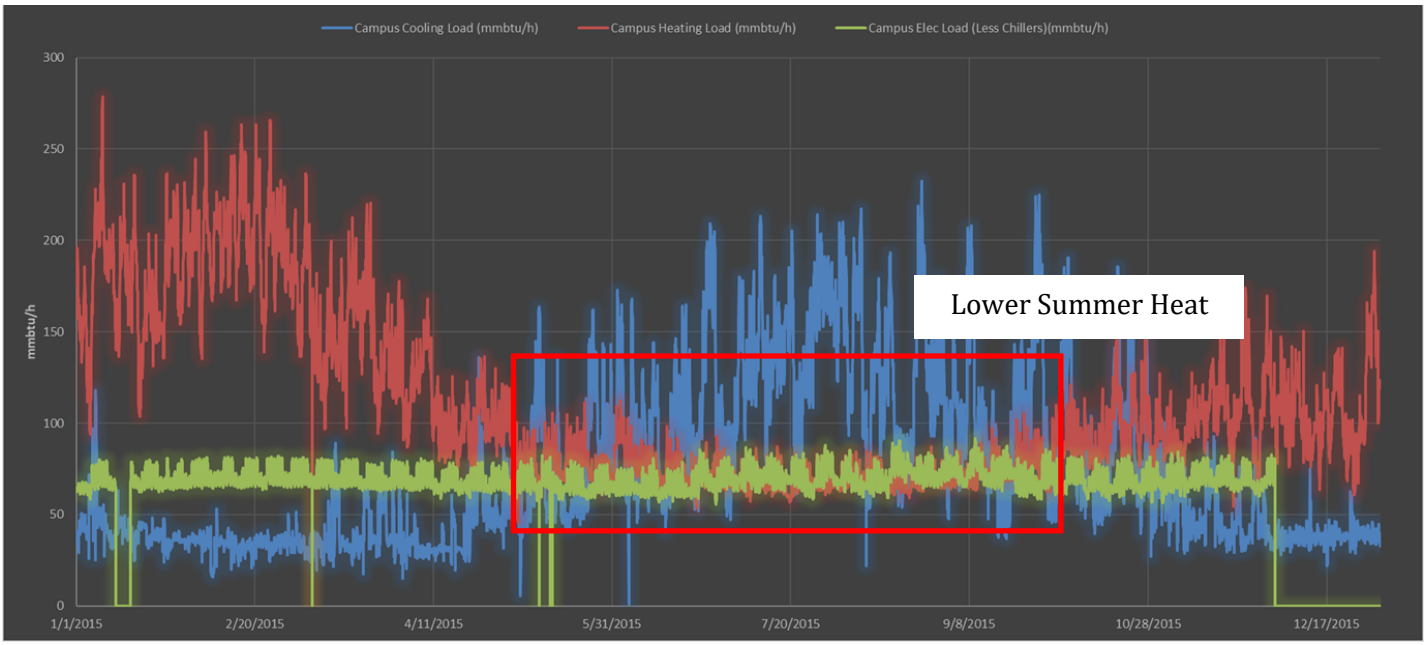


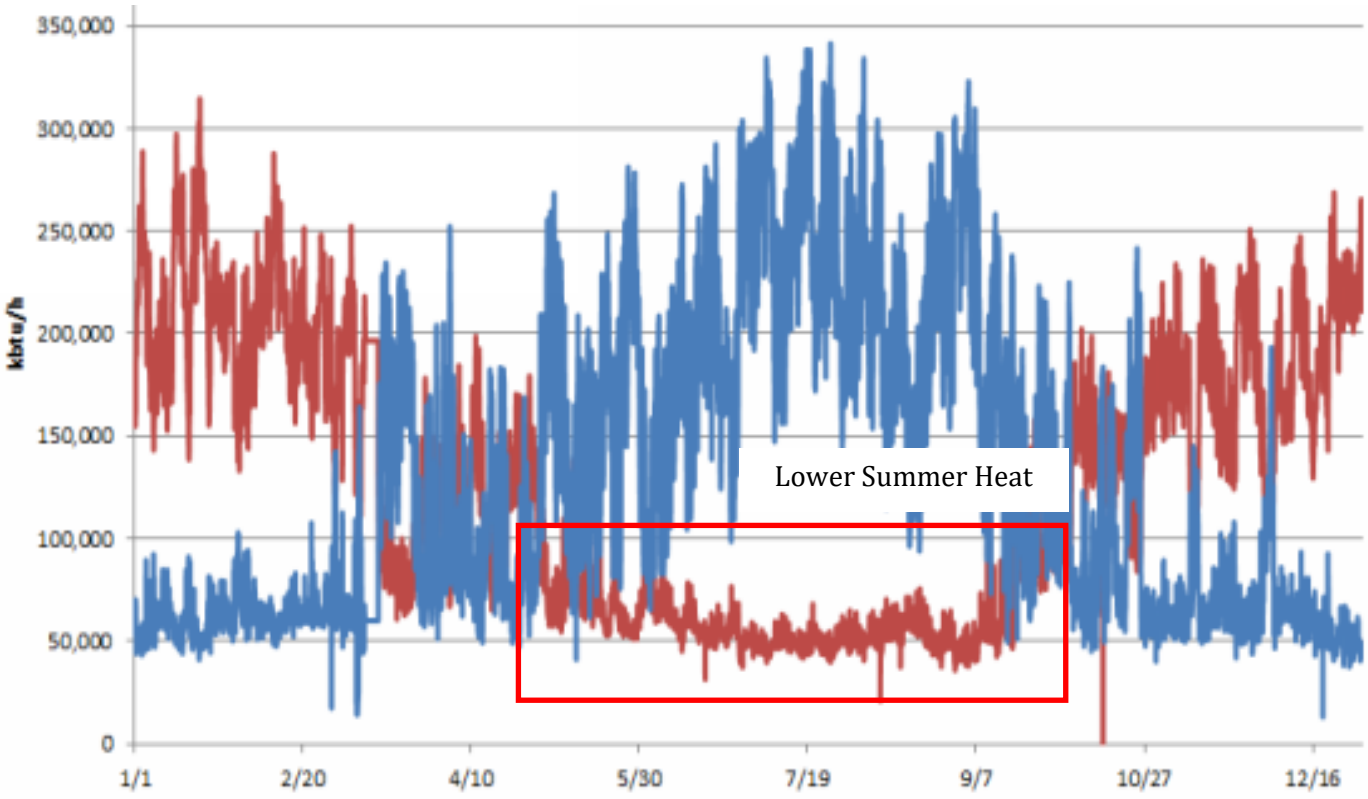
The above profile shows that the campus heating load in the summer is higher than the campus cooling load when comparing normalized energy units. This is an unusual dynamic for a college campus (even a research-intensive campus), and based on this analysis **we conclude that the TCNJ summer campus heating use is high, and a primary opportunity for improved efficiency.**

This conclusion is based on the above described analysis which utilizes both trended information and the above documented assumptions for component performances. Additional metering and trended data could be used to confirm our conclusion based off of exclusively empirical data, and not a combination of empirical data and calculated values.

The conclusion that the TCNJ summer campus steam use is high is also based on our observation of other campus annual energy profiles for heating cooling and electricity. The following are examples of other university profiles showing that the heating load in the summer is typically less than the cooling load in the summer. It is worth noting that both of these institutions are heavily research driven with summer dehumidification requirements due to large ventilation loads in the laboratories. It is our understanding that TCNJ does not have a high summer laboratory ventilation load requirement.

Graph 8 – Profile for annual heating, cooling and electric consumption (Peer Campus 1 and 2)

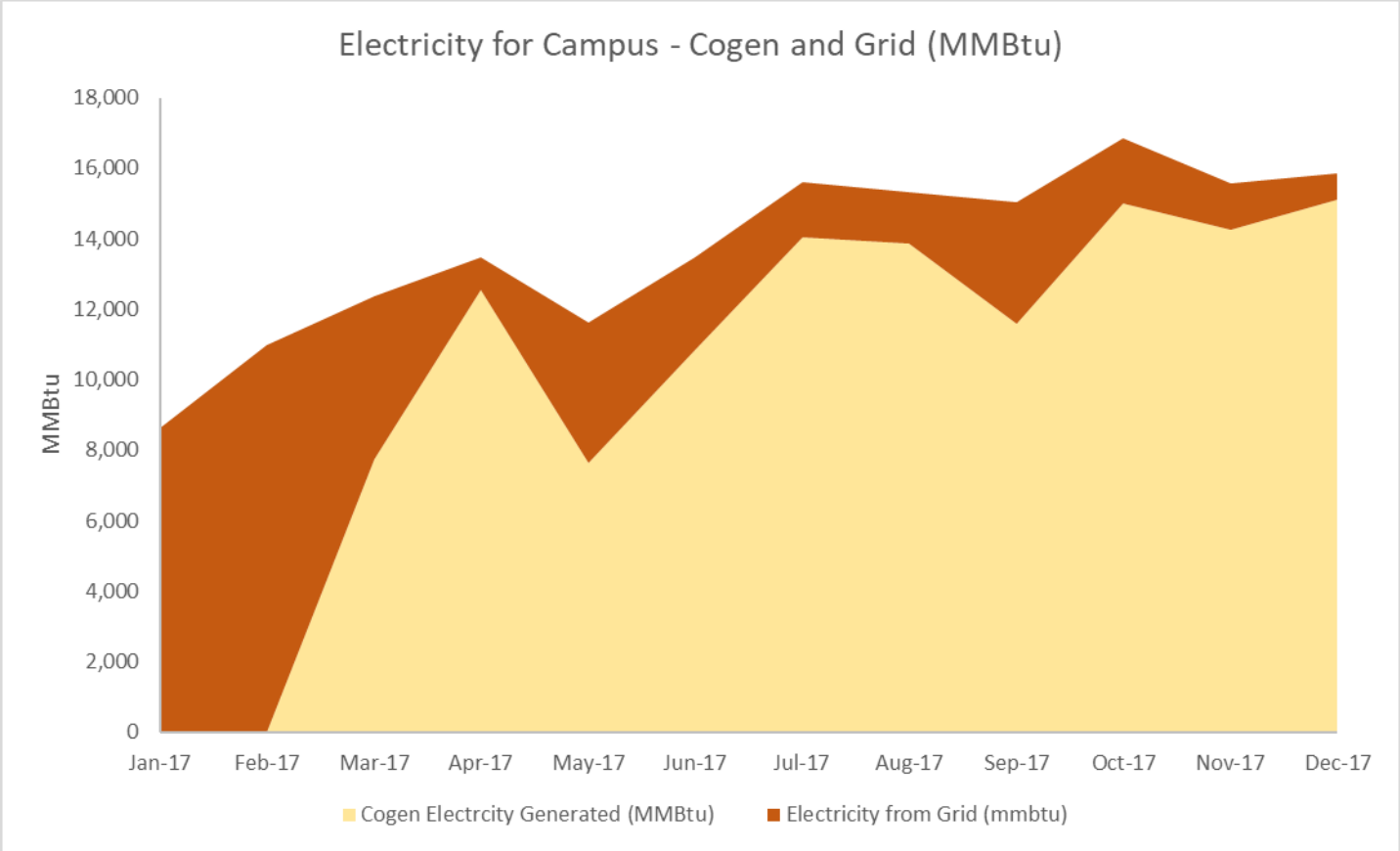



350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
kbtu/h
1/1
2/20
4/10
5/30
7/19
9/7
10/27
12/16
Lower Summer Heat

Annual Profile for Campus Electric Production

The following is a profile for the total monthly consumed electricity produced by the Cogen and purchased from the grid.

Graph 9 –Profile of monthly total electric for grid and cogen electricity



The above profile shows that the cogeneration plant was down for January and February 2017, and that the normal operation of the cogeneration plant will provide the majority of campus electricity.

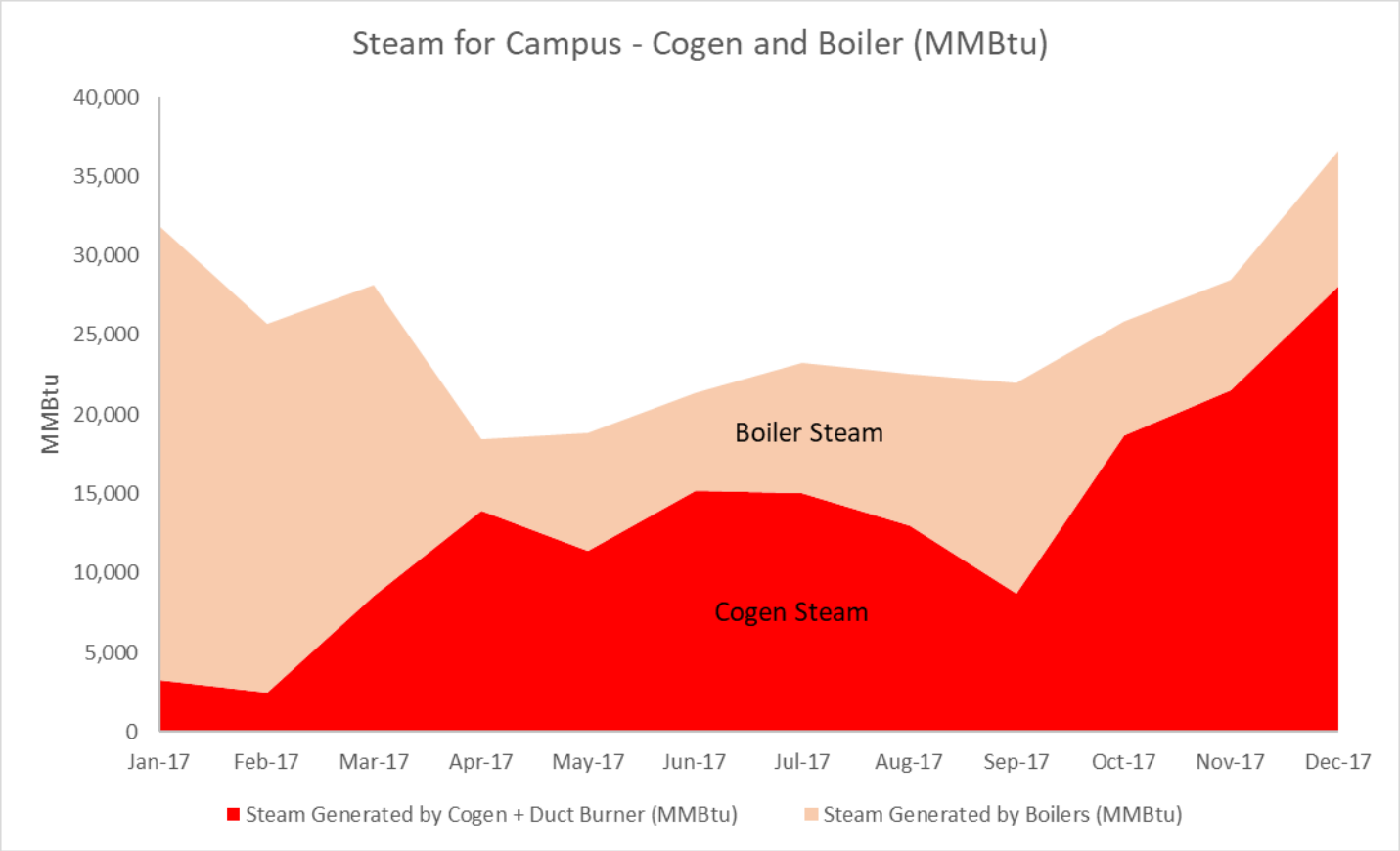
The general operation of the cogeneration plant is to produce electricity at a rate such that there is a small importation of power from the grid less than 1 MW.

As noted in the observations and recommendations section we observe that the Cogen electricity is produced at a 29% efficiency based on snapshot readings of the cogeneration plant performance

Annual Profile for Campus Steam

The following is a profile for the total monthly consumed steam produced by the Cogen system (fired and un-fired HRSG) and produced by the boilers.

Graph 10 – Profile of monthly total steam production from boilers and fired/unfired HRSG

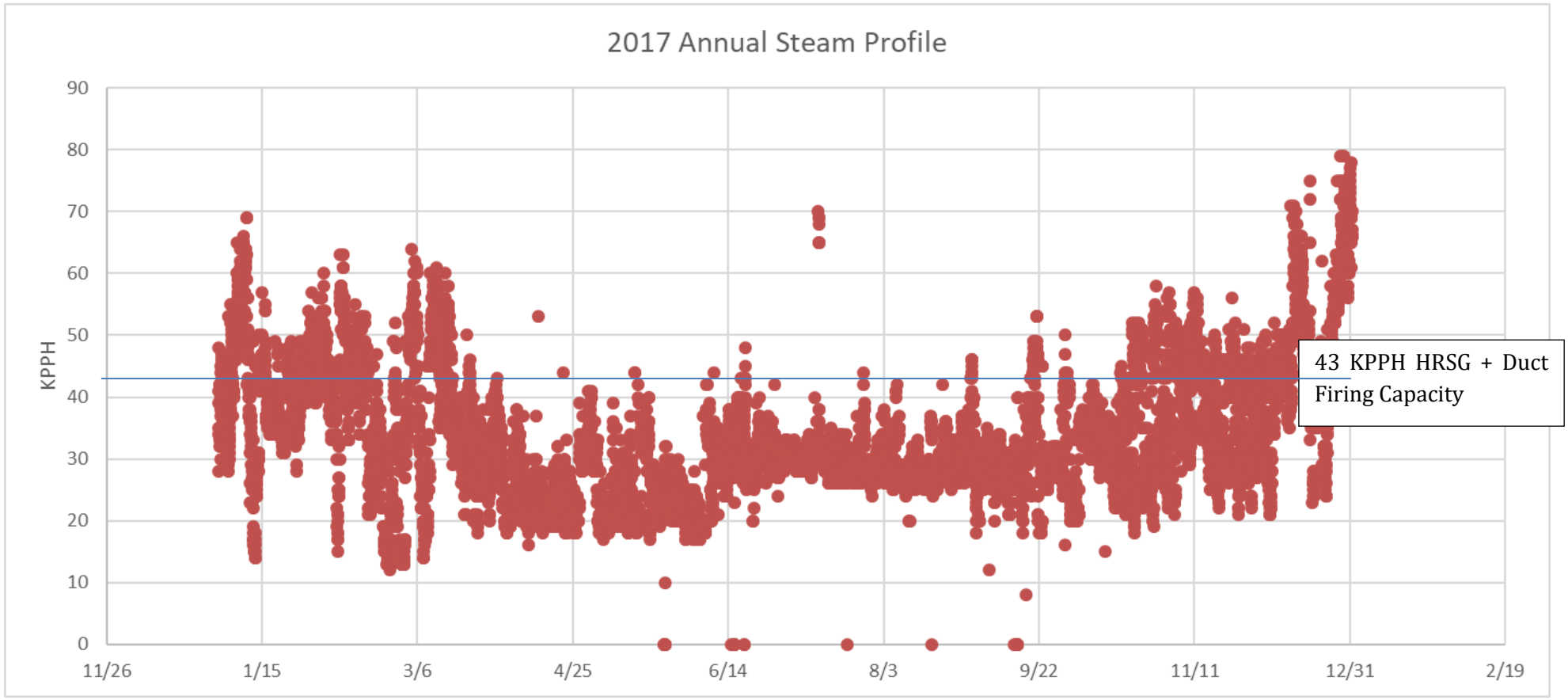


From the above profile we can see that the boilers make up a substantial portion of the generation of steam, even in the summer when the unfired and fired steam from the HRSG should be adequate to meet the campus steam requirements. This is worth noting because the HRSG steam is produced more efficiently and at a much reduced gas rate. As described later in this report, **we recommend preferentially loading the HRSG before operating the boilers**, which the site operators understand in principle but based on the data may not be fully following. It is worth noting that there may be understandable reasons for not preferentially loading the HRSG, however, we have not uncovered a reason. Follow-up discussions with the operators indicated that over the past year the HRSG was not fully loaded because of prior tube failure and not wanting to add stress to the tubes.

Steam Hourly Profile

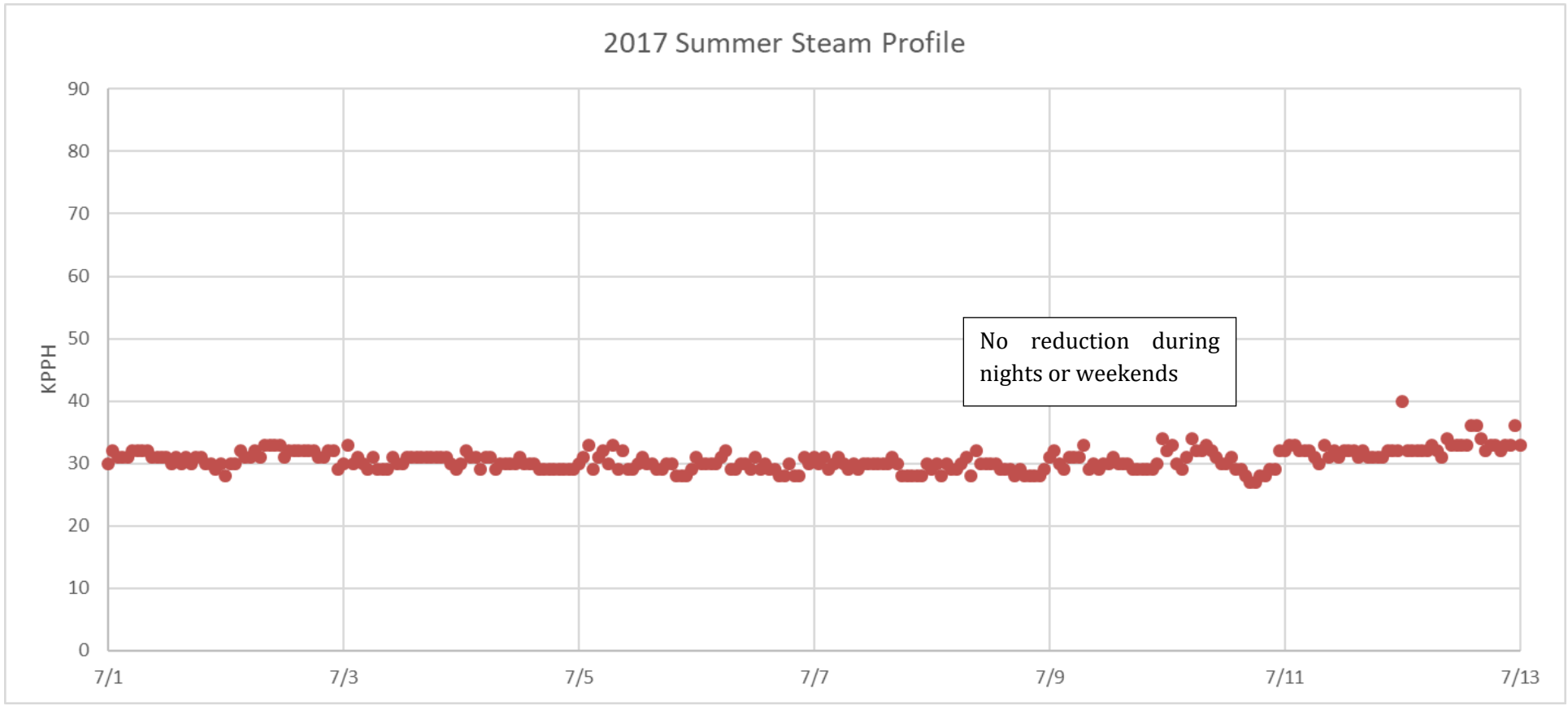
The one hourly interval data point available for this analysis is the 2017 hourly production of steam by the Cogen and boiler plant. The following is an annual profile for this production.

Graph 11 – Annual steam profile from hourly interval data



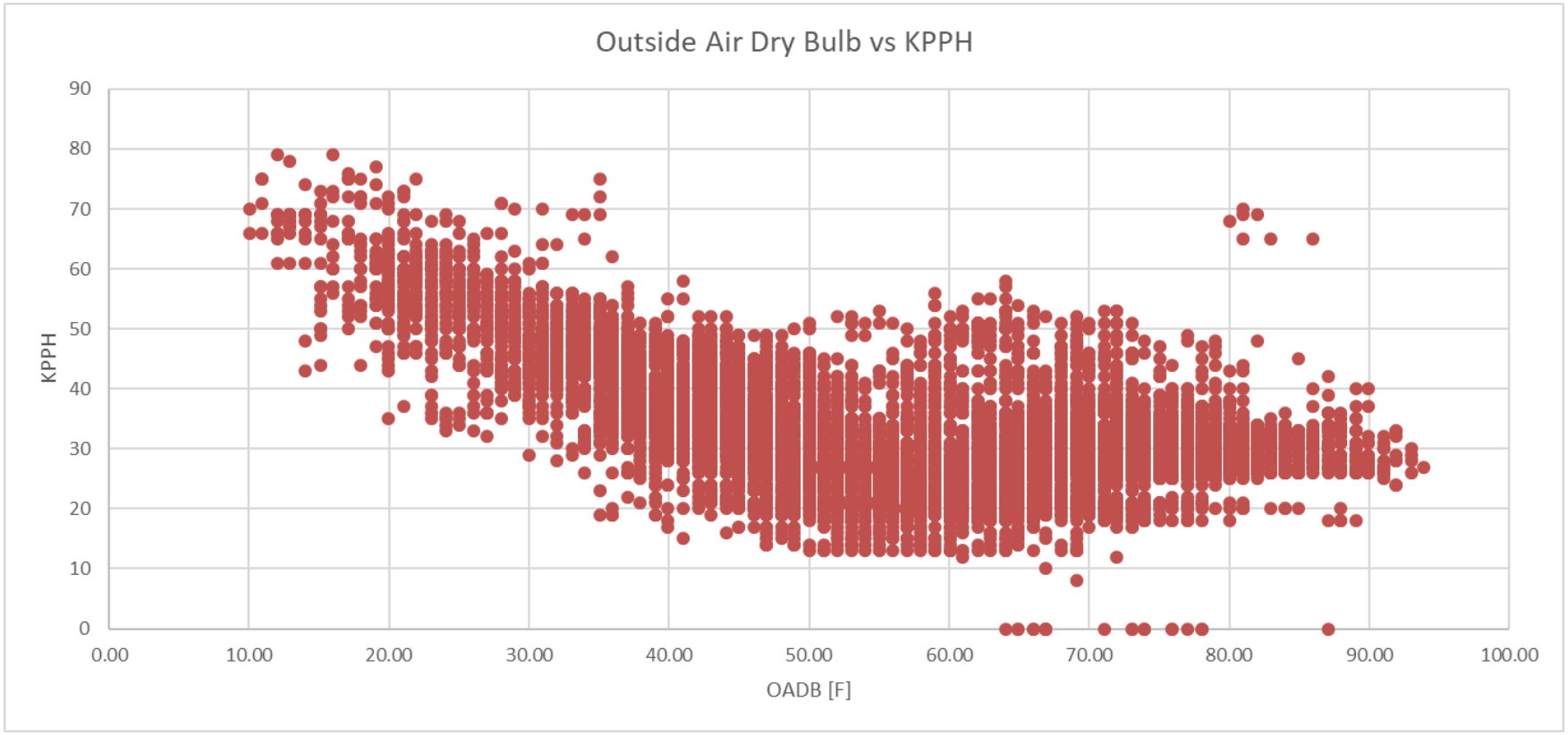
A profile for one summer week is shown in the following figure.

Graph 12 – Hourly steam profile for 1 summer week



A plot of the campus steam load vs. Outside air tribal is shown in the following figure.

Graph 13 – Plot of outside air temperature vs steam production



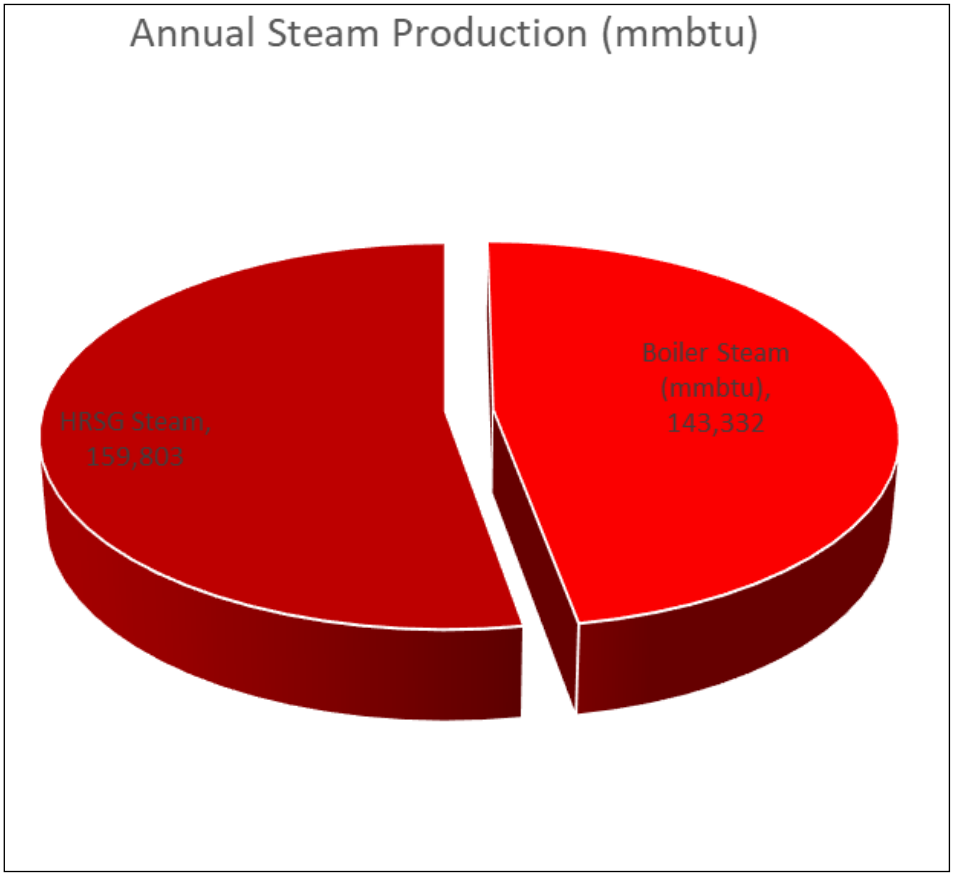
From the above profiles we have the following observations:

1) **The high summer steam load which averages approximately 30,000PPH**
2) **The stated capacity of the fired and unfired HRS G is 43,000 pounds per hour, which should be able to meet the majority of the hairs demand, with the need for boilers.**
3) **There is no reduction in the load for nighttime or weekend periods. One interpretation of this data is that the campus has minimal use of night setbacks, which should be apparent from the trends**.

Annual Breakdown of Steam Production

A graphical representation of the annual breakdown of steam production is shown in the following figure.

Graph 14 – Breakdown of annual HRSG and Boiler produced steam



Form the above we can see that the Boilers produce a substantial percentage of the annual steam.

General Conclusions for Energy Benchmarking and Load Profile Analysis

The following are general conclusions from our review of the campus energy benchmarking information and load profiles:

1) Campus steam use appears to be higher than average, which contributes to increased cooling energy as well (7% higher than NE Universities).
2) Contrary to the Sightlines conclusion that "inefficiencies in the cogen plant could explain high consumption" we conclude that efficiencies in the cogen plant mask the inefficiencies of the campus.
3) We observed an electrical efficiency of 29% (compared to the sightlines observed 19%).
4) Exact breakdown of energy use would be more accurate with additional metering and trending of key plant energy flows.
5) Building metering would provide data to develop comprehensive energy roadmap
6) The TCNJ summer campus heating use is exceptionally high
7) the summer steam is excessively met by the boilers rather than the unfired and fired HRS G, which is a cheaper means of producing steam both because of its improved efficiency compared to the boilers and in substantially reduced natural gas fuel rate. The average summer steam load of 30,000 pounds per hour, based on the rated capacity of the HRSG, should be able to be met for the majority of the summer and most of the shoulder seasons without boiler operation
8) There is no reduction in the load for nighttime or weekend periods observed from the hourly steam profiles. One interpretation of this data is that the campus has minimal use of night setbacks, which should be apparent from the trends.

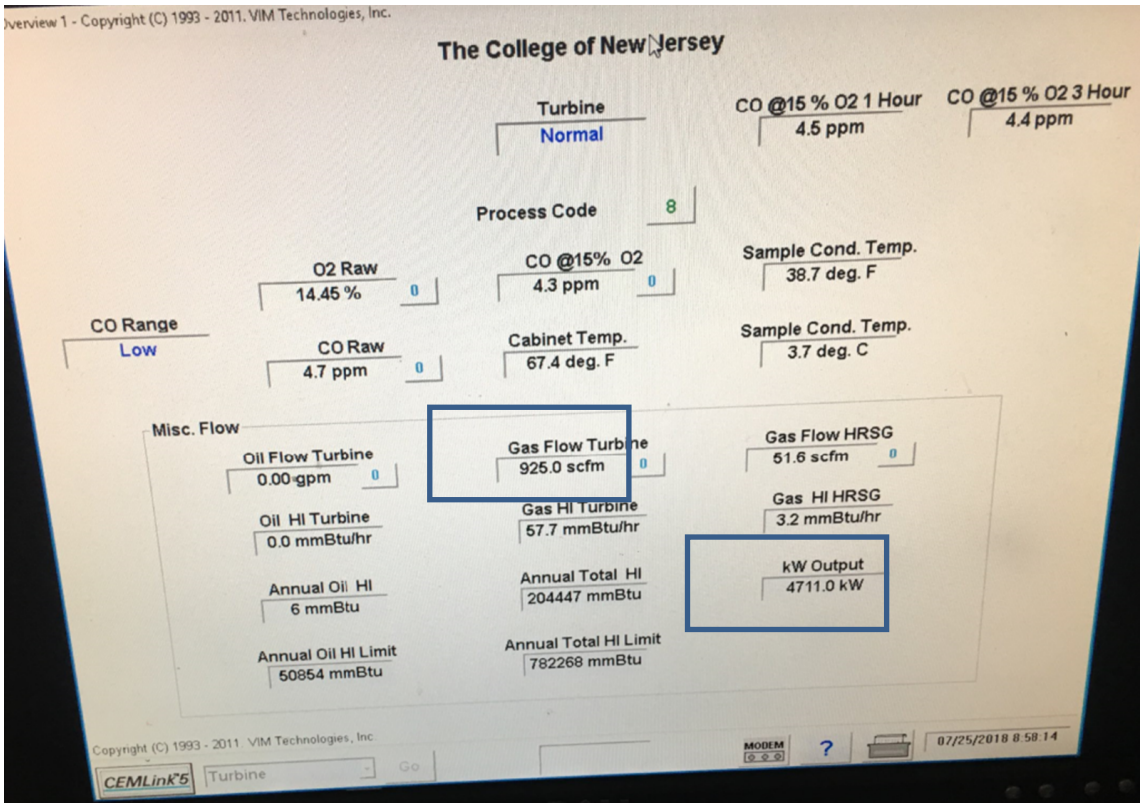
6. Field Observations

The following is a list of additional observations and recommendations related to the operation of the cogen plant, chilled water plant and campus dynamics.

FO.1 – Cogeneration Plant Efficiencies in Line with Expected Performance

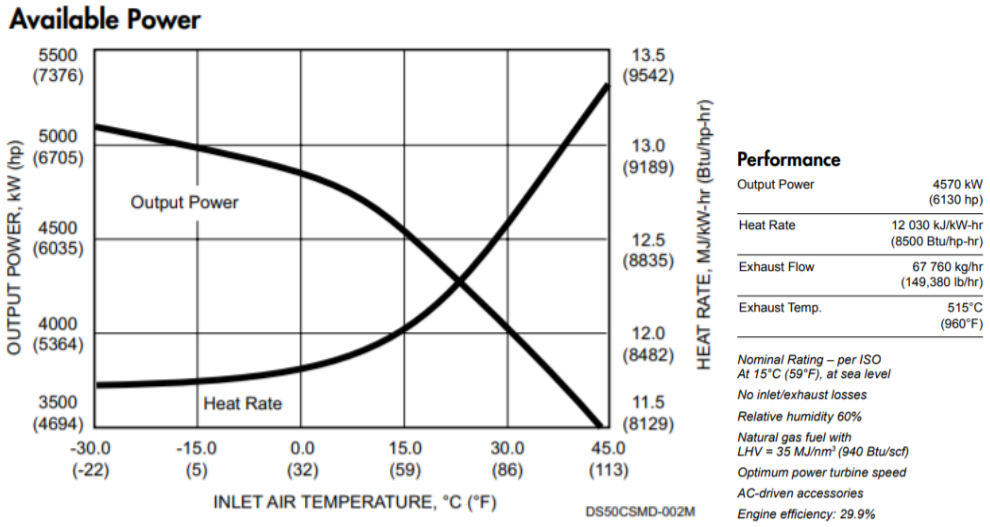
The following are key metrics for our snapshot observation of the cogeneration plant indicating that the cogeneration plant components are operating efficiently, supported by the following figures.

Image 2 – Screenshot of gas turbine screen



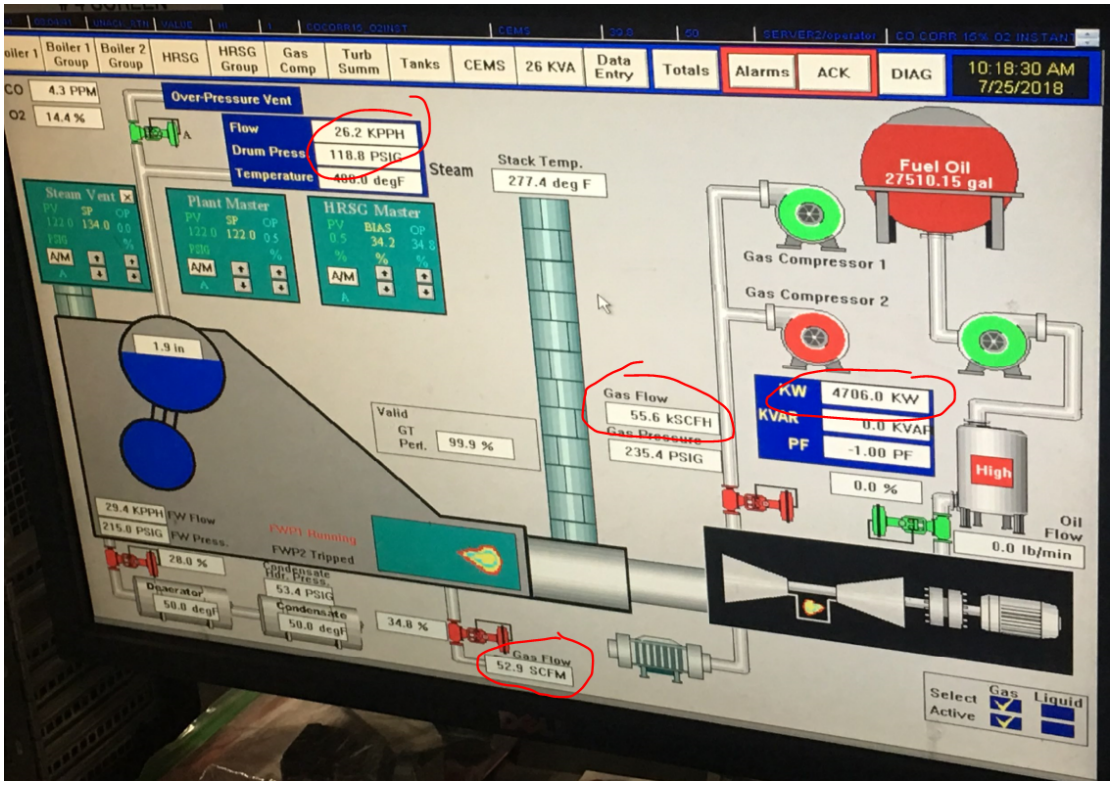
From the above snapshot of turbine performance we calculate an electrical efficiency of approximately 29%.

Image 3 – Excerpt from Solar Taurus 60



This 29% electrical efficiency is approximately in line with the expected performance of a Solar Taurus 60.

Image 4 – Screenshot of turbine and HRSG HMI



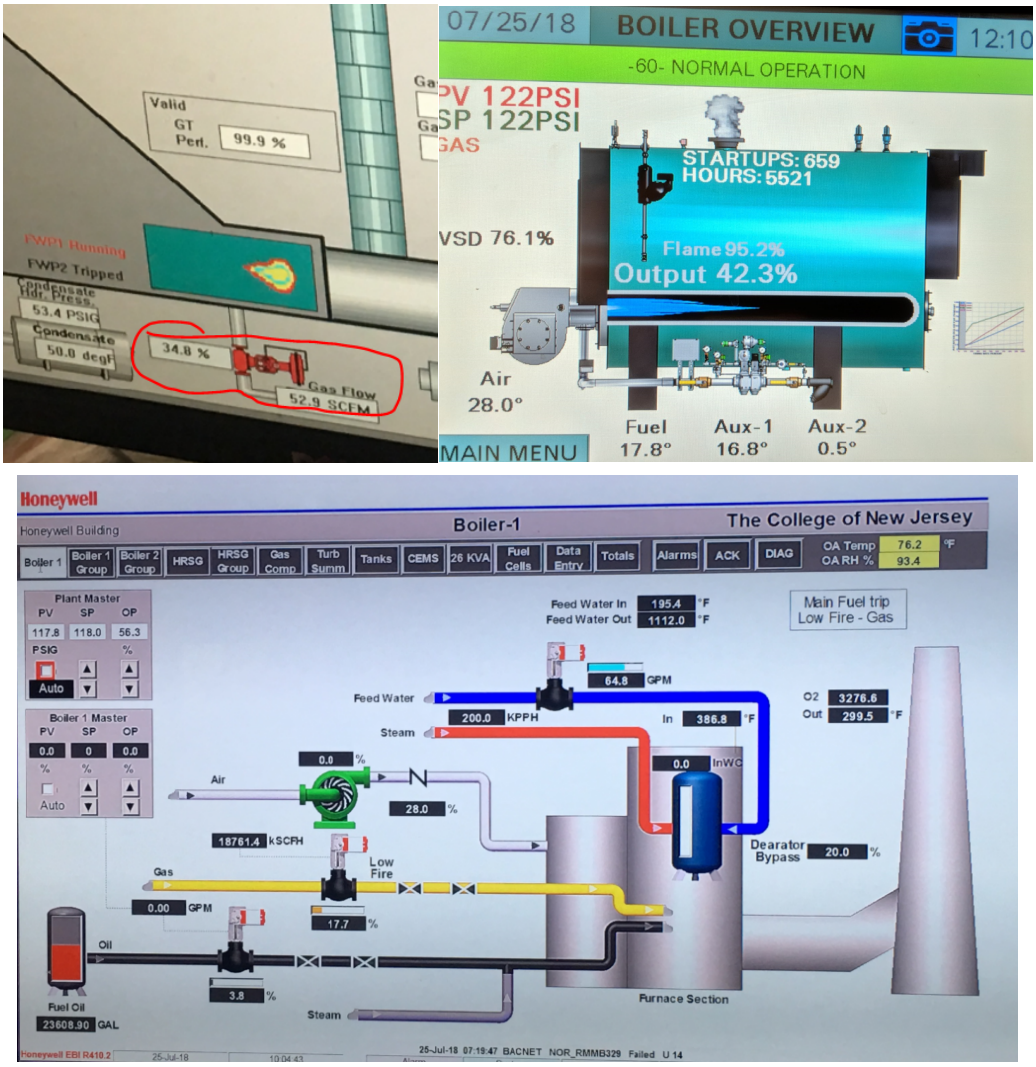
From the above figure we see that the after-HRSG stack temperature is approximately 277 degF, indicating that the thermal energy recovery is approximately in line with the expected.

FO.2 – Boilers Operated in Summer when HRSG Could Meet Steam Load

During our summer visits we observed that the HRSG was not fully fired and a boiler was used to deliver much of the summer steam.

The following are coincident snap-shots of the operation of boilers and HRSG.

Image 5 –Coincident screenshots of various components of the Cogen and Boiler plants

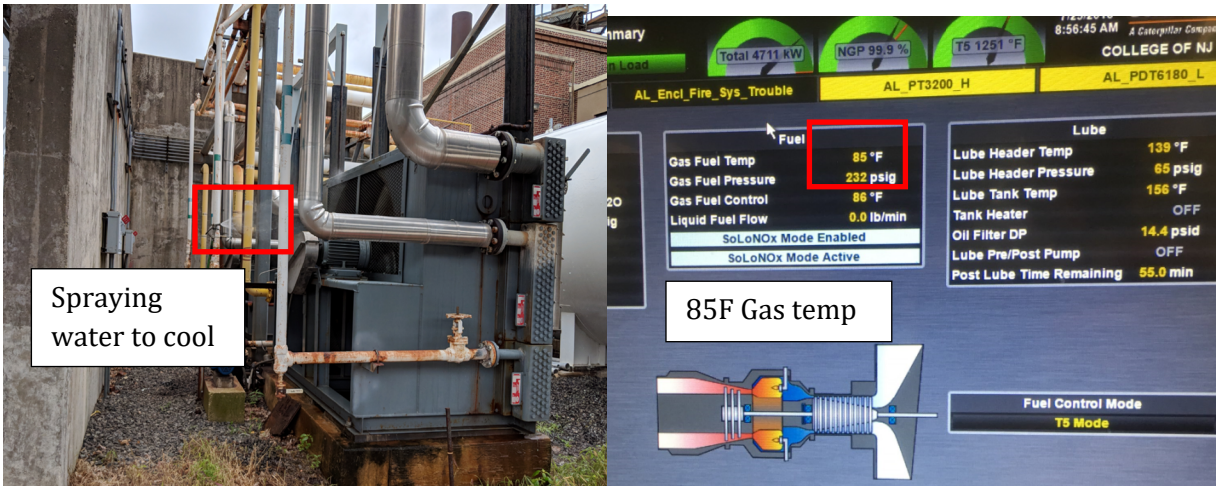


From the above figures we can see that the HRSG is not fully utilized and a boiler is operated. Based on review of the operator trends we can see that this dynamic occurs for much of the summer, sometimes with more than one boiler in operation.

FO.3 - Gas is Pre-Cooled Excessively

We observed that the inlet gas to the turbine is being cooled via a dry cooler that is being sprayed by a domestic water hose. As further described in the Recommended Measures section, cooling the inlet gas below the required temperature for turbine operation does not have energy benefits and the spring of untreated water on the coil will eventually lead to buildup on the coil and degradation of its performance.

Image 6 – Image of natural gas inlet cooling with spray hose and discharge temperature of 85F



FO.4 - Turbine Inlet Cooling Coil Operated "Wild"

The inlet air for the turbine is cooled with a chilled water coil on the roof, however the control valve for this chilled water has been deactivated and there is continuous flow through the coil until the winter when the coil is drained. We do recommend continuing to run chilled water through this coil in hot conditions, however there is reduced benefit for full flow through the coil under shoulder season conditions and this whole flow will degrade the chiller plant chilled water supply and return Delta T.

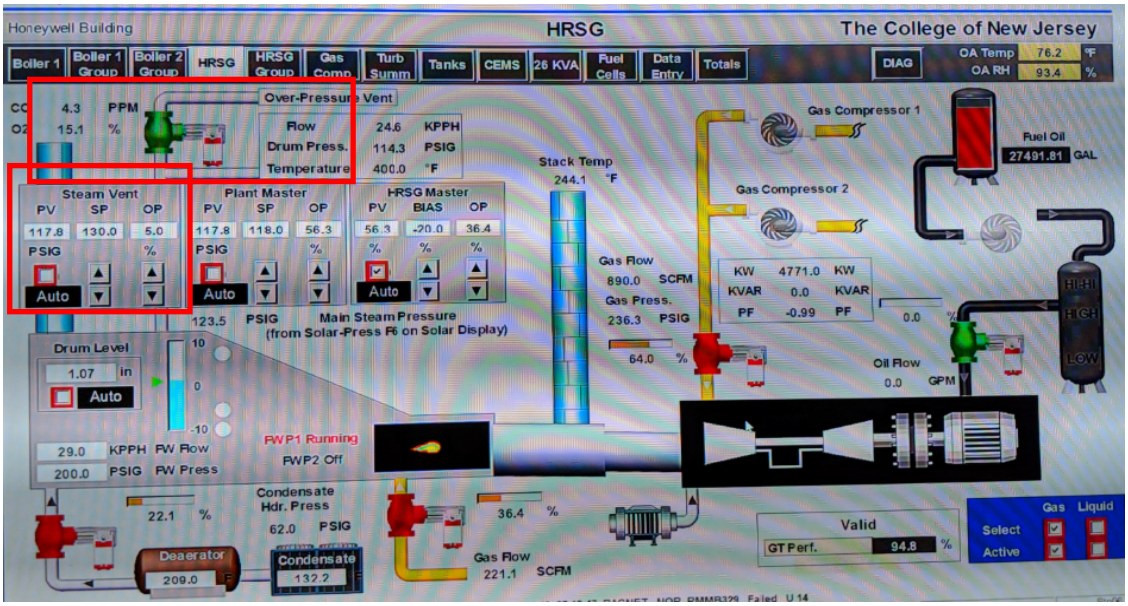
We recommend re-connecting the control valve actuator to maintain a setpoint for the inlet air cooling coil leaving air temperature.

Image 7 – Image of turbine inlet air cooling coil and control valve (actuator disconnected)

FO.5 - Steam Vent is Potential Source of Lost Steam

There is an over pressure steam relief vent located in the boiler plant which controls to prevent the steam pressure from exceeding 130 PSI. In discussions with the operators this event will open in shoulder conditions, however we did not observe this steam vent open. We recommend trending the position of the steam vent to confirm that it is not frequently opened except during periods of high load swings and only to allow the thermal system time to ramp back.

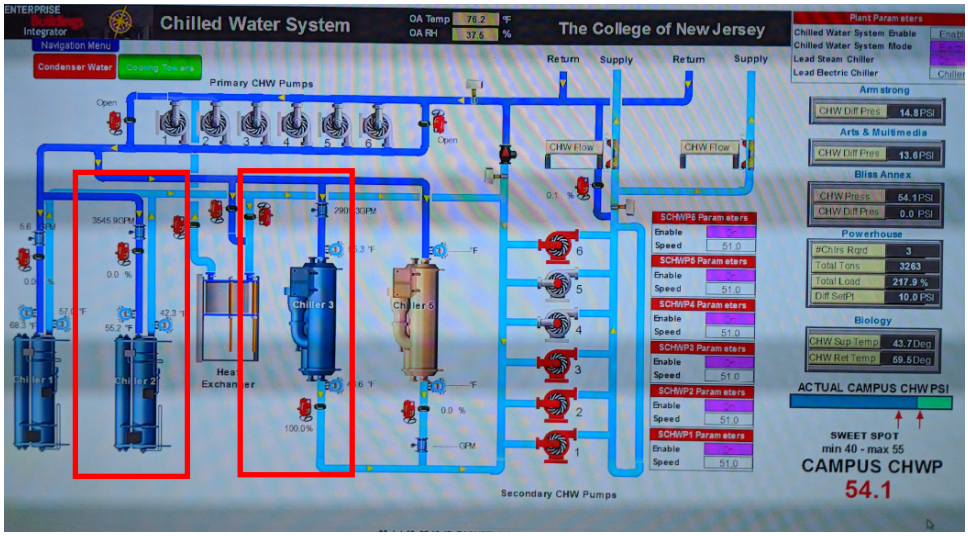
Image 8 – Screenshot of cogen HMI showing over-pressure relief valve



FO.6 – CHW Load is Met with Mix of Steam and Electric Chillers

There are no trends available to allow us to identify the breakdown of use between the steam and electric chillers. On the days that we surveyed, both electric and steam driven chillers were operated. Quantification of the benefit of steam chillers versus electric chillers is described further in the recommended measures section.

Image 9 – Screenshot of CHW HMI showing simultaneous operation of steam and electric chillers



We recommend the following points be trended for hourly average values and stored in the data historian:

- All flow meters
- All measured temperatures

FO.7 – Opportunity with Building Energy Savings Enabled

Although there are building energy meters in place for some buildings for chilled water, steam, and electricity, this information is not being trended in a single repository and was not available for our analysis. Studies we have done for similar institutions have greatly benefited from building energy meter information. As described in the recommended measures section we recommend expansion of the existing building metering system and consolidation of the metering data into a single information repository.

One of the primary benefits of building energy meters is that they enable focused efforts to reduce high energy use on campus. The building energy meters can be used to prioritize efforts at the building to optimize HVAC systems, then act as a tool for measurement and verification to ensure that the optimization projects result in desired savings and continually monitor.

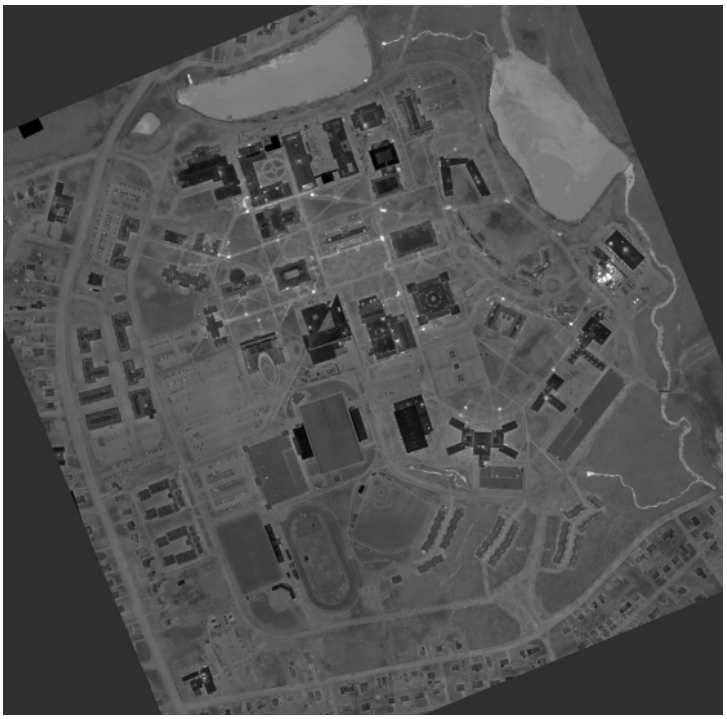
Based on our review of the campus benchmark values and experience with optimization at the building level, we see an order of magnitude savings between $400,000 to $650,000 per year, representing an annual reduction of 10%-15% of annual costs. We recommend implementing a pilot project to implement building system optimization in 1-2 buildings (with existing metering) and document impact.

FO.8 - Steam and Condensate Leakage is not Apparent Cause of High Steam Use

TCNJ has previously observed high steam use in a variety of seasons. The campus executed an aerial infrared survey to identify potential sources of steam leaks. Based on the results of this survey, which was completed in the winter, we do not see apparent major steam leaks. This does not mean that there are not steam leaks which were not active during this survey or work for some reason not captured by the survey, but this evidence leads us to think that the cause of high steam use resides in the buildings, and not in the distribution.

The following is an excerpt from the campus aerial infrared study

Image 10 – Excerpt from the campus aerial infrared study



This opinion is further supported by the reported high condensate recovery, which is reported to average around 70%-75% per plant operators. Makeup water data is not available for this study, so this evidence comes from information given during the operator and engineering management interview process. Should this condensate return percentage be much lower, this would be evidence supporting issues in the distribution; however, low condensate return percentage does not exclusively support steam leak since it may only support condensate leak.

Furthermore, the order of magnitude of steam consumption in the summer, which averages approximately 30,000 PPH, should a substantial portion of it be attributable to steam leak would be visually apparent on campus. In other words, 5000 to 15,000 PPH steam leaks are noticeable.

Based on the above, we are inclined to think that the steam consumption exists within the buildings, and this could be further supported by additional building steam metering and building study and optimization efforts.

FO.9 - CHW Plant Controls Deficiencies

The campus chilled water plant recently executed an upgrade project that included upgrading the cooling towers and a number of controls components. At the time of our survey the project had not been fully closed out and there were a number of observed operational issues apparent from review of the HMI screen. Appendix B lists these observed deficiencies.

FO.10- Limited Plant Energy Metering

As described throughout this report, there are a number of assumptions and calculations that we performed to draw many of the conclusions. Based on similar scopes with other institutions, we have found the use of plant energy metering to be a very valuable tool for this process, as well as, more importantly, a tool for continually monitoring the performance of the systems. We recommend key energy streams and operating parameters be trended. Trended plant values which we consider to be most useful include:

1. CHW Load Trending (per chiller)
2. Steam Trending (campus, plant)
3. Steam vent valve trending
4. Cogen elec trends, import trends
5. Condensate return trends
6. Equipment Status (CHWP, CWP, Chiller, Boiler, CTs)
7. Amps, KW
8. Flows, pressures, temperatures
9. Valve positions

FO.11 Opportunity for Participation in NJ Clean Energy Program LEUP

One of the rebate programs which we have had the success with for gathering funds for similar campuses in New Jersey is the Large Energy User Program. This program funds as follows:

- 75% of project cost
- $0.33/kwh
- $3.75/therm

As an example, Measure 2, which reduces summer boiler use by an average reduction of 11.6 mmbtu/h, could fund up to $2.1M, if the implemented solution met the required qualifications for the upgrade.

Participation requires $200k contributed to the NJ CEEP

FO.12: Recommend Maximizing Participation in Demand Response Programs

Another program that campuses the size of TCNJ often participate in are the demand response programs available from PJM. There are three main categories for these programs:

Emergency Demand Response (ICAP)

The peak load contribution (PLC) is the average of the five (5) highest usage hrs in any given delivery year. Delivery years begin every June 1st. Every public utility client has a peak load contribution (PLC) tag that is established at the beginning of the delivery year. This PLC tag is used to determine the demand charge for the associated client for that delivery year. An ICAP event is a period of time when the campus is in danger of exceeding its PLC for that delivery year. A curtailment service provider (CSP) monitors various environmental and market conditions and predicts in advance potential ICAP event days. Notice of these potential ICAP events are sent to the campus via email.

Historically, PJM has called 1–2 dispatches per year in any given zone. If an emergency dispatch is not called, PJM requires us to dispatch participants simultaneously for a one-hour audit to demonstrate performance capabilities

Economic Demand Response

These programs offer optional participation and revenue streams

- Day Ahead Market
- Real Time Market
- Dispatched by PJM in Real Time

Ancillary Services

There are additional rapid demand management programs that can offer a potential revenue stream, but require more intricate integration and dispatching

- Synchronous Reserve
- Frequency Regulation

TCNJ has the ability to export power, but typically maintains a 0.1 MW import buffer and does not operate the 5.2 MW cogen to full capacity. We recommend further study to analyze demand response approaches and opportunities:

1) Reduce the buffer of electrical import by increasing cogen
2) Reduce building electrical demand
3) Use of steam chiller over electric chiller
4) Execute combination of above to export power

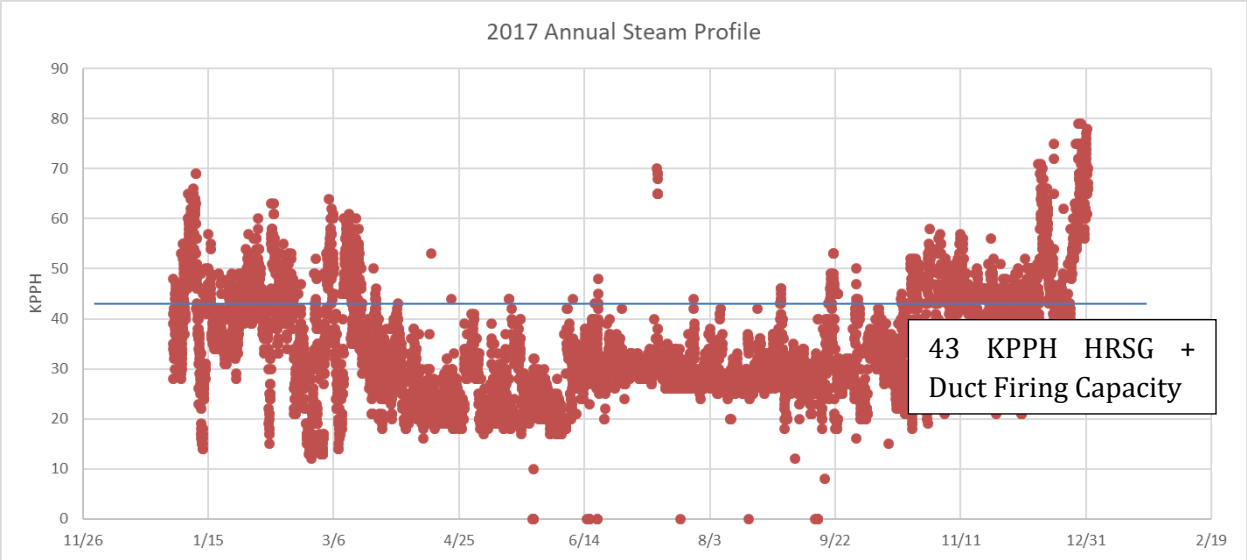
7. Analysis of Recommended Measures

The following is an overview of the recommended measures for both implementation and further study

Measure 1: Maximize use of Duct Firing

As described in the Field Observations section, we observed the boilers to be in operation during our summer visits, and the data supports the conclusion that boilers are operated for much of the summer when the fired and unfired HRS G could meet the campus load, as supported by the below steam load profile which shows that the campus steam load is less than the reported design capacity of the fired her sig of 43,000 pounds per hour.

Graph 15 – Hourly profile for campus steam production



The HRSG is a much more cost-effective producer of steam than the boilers for two reasons:

1) The gas purchased for Cogen is cheaper than the gas purchased for the boiler
2) The HRSG is more than 95% efficient compared to the boilers which are 85-87% efficient

This measure assumes:

- ~10,000 PPH of average duct burner that is under-utilized (this assumption could be further refined with additional trended data)
- Cogen HRSG: 43,000 PPH (28,000 Unfired, +15,000 firing gas only ductburner)
- 86% efficient Boiler
- 96% Efficient Duct burner
- Cogen gas is purchased at 4.37 $/mmbtu
- Boiler gas is purchased at 6.58 $/mmbtu

A. Results

Below is a summary of the energy and financial results for this option.

Table 10 –ECM.1 Financial Summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 1: Maximize use of Duct Firing	NA	NA	NA	12,473	$ 280,000	1,020	$ 280,000	Cost savings comes from both improvement in efficiency (mmbtu savings) and cost savings for reduced gas rate with HRSG gas.

Measure 2: Reduce Summer Steam use:

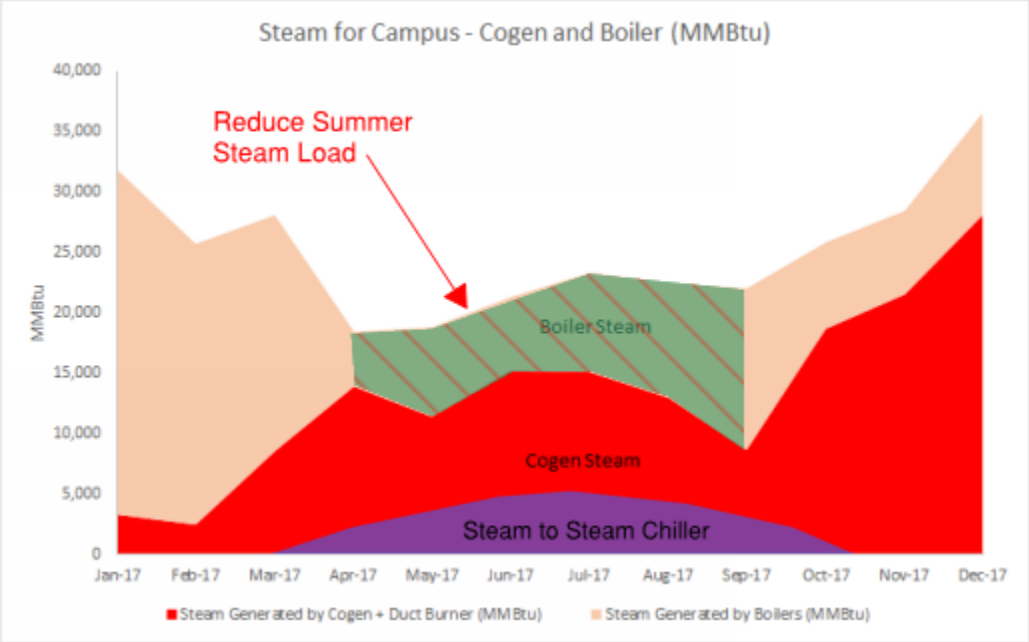
As described in the energy benchmarking and load profile analysis section of this report the TCNJ steam consumption in the summer is exceptionally high. The evidence indicates that this consumption is likely within the buildings. Quantification of the extent of the unnecessary summer steam use requires further studies within the buildings, but this measure estimates a reasonable reduction

This measure assumes:

- Summer load can be reduced so that operation of boilers are eliminated and current HRSG is adequate for campus steam load and steam chiller.
- Average summer reduction of 11.6 mmbtu/h is possible
- If the reduction extends to winter operation, additional savings possible

Our recommendation is to further study the building systems to identify unwanted use of steam (simultaneous heating and cooling).

Graph 16 – Monthly total profile for current steam production, identifying summer use of boilers and potential reduction.



A. Results

Below is a summary of the energy and financial results for this option.

Table 11 –ECM.2 Financial Summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 2: Reduce Summer Steam use:	NA	NA	NA	41,702	$ 274,402	3,411	$ 274,402	Presumes April thru August steam use reduced by an average of 11.5 mmbtu/h

Measure 3: Optimize Usage of Steam and Electric Chiller

This measure analyzes the economics of operating the steam and electric chillers. There are no trends available to allow us to identify the breakdown of use between the steam and electric chillers. On the days that we surveyed, both electric and steam driven chillers were operated.

The following are the major simplified considerations for this analysis:

1) Cogen gas is purchased at an average (blended rate of) 4.37 $/mmbtu
2) Boiler gas is purchased at an average (blended rate of) 6.58 $/mmbtu
3) Grid Elec is purchased at an average (blended rate of) $28.17 $/mmbtu
4) The steam chiller varies in efficiency based on part load operation and condenser water temperature, but for this analysis operates an assumed average efficiency of 9 lb/ton and electric chiller average efficiency of 0.55 kw/ton
5) When fully loaded the electric chiller consumes approximately 825 kW
6) The cogeneration plant typically operates with an electric import buffer of between 0.5 to 1 MW.

The following are the major conclusions from our analysis:

1) Operation of the steam chiller is more cost-effective than the electric chiller when:
    a. Steam is generated by fired or unfired HRS G, and
    b. Transition from the electric chiller to the steam chiller does not result in the Cogen electric production being ramped back due to the need to maintain an importation buffer of electricity
    c. OR, if operation of the steam chiller is dictated by future participation in a demand response program
2) Operation of the steam chiller is not more cost-effective than the electric chiller in all other scenarios
3) Based on our review of the general operating parameters of the electric production and importation of electricity from the grid it appears that transition from electric chiller to steam chiller would reduce the Cogen power production, and the summer steam is frequently made by boilers, the electric chiller is likely to continue to be the more cost-effective chiller for much of the cooling season.
4) Should the site successfully implement Measure 1 (Maximize use of Duct Firing), we recommend further study into the economics of reducing the importation buffer such that additional electricity could be generated by the Cogen even when the cooling is transitioned from an electric chiller to a steam chiller.

The following is the potential for energy cost savings should Scenario 1 described above be true for most of the summer

A. Results

Below is a summary f the energy and financial results for this option.

Table 12 –ECM.4 Financial Summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 4: Increase Usage of Steam Chiller (Only when duct firing)	1,897,500	825	$ 182,380	-32,684	$ (142,830)	-1,938	$ 39,550	Only when duct firing, and if transitioning to steam chiller does not reduce CHP elec production

Measure 4: Increase Compressed Gas Temperature

As described in the Field Observations section, the turbine inlet gas is cooled via spray cooling the dry cooler with a hose. The observed inlet gas is cooled to 85degF. This measure quantifies the benefit of saving by increasing the natural gas temperature setpoint. It is important to note that further study is needed to confirm operating limits for the turbine before increasing any setpoints or operating practice. Savings depends on the extent of

Table 13 – Summary of savings with increased gas cooling temperature

$/Dtherm	4.37	Mlbs/Year of Natural Gas		25,218
kW/Mbtuh Cooling	0.06	NG Specific Heat (btu/lb)		0.577
$/kWh	0.09			
Temperature Increase Above Current Operation (°F)	Exit Temp (°F)	First Stage Exit Temperature* (°F)	NG Reduction to Combustor (Mbtu)	NG Reduction ($/Year)
40	125	268	582,038	$2,544
50	135	273	727,548	$3,179
60	145	278	873,057	$3,815
70	155	283	1,018,567	$4,451

A. Results

Below is a summary of the energy and financial results for this option.

Table 14 –ECM.5 Financial Summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 5: Increase Compressed Gas Temperature				1,018	$ 4,451	83	$ 4,451	Assumes average temperature increase of 70 degF. Requires further study to confirm upper limit.

8. Conclusions and Recommendations

The following are general conclusions and recommendations from our review of the campus operations:

1. Campus Energy Use: Campus energy use, when normalized for performance of the cogeneration system is higher than average (approximately 7% higher than NE Universities), In particular, the campus use of steam in the summer is higher than average (which also contributes to higher cooling consumption compared to average).
2. Likely culprit for high steam use is in buildings: We are inclined to think that the steam consumption exists within the buildings, and this could be further supported by additional building steam metering and building study and optimization efforts. Evidence for this conclusion is based on:
    a. Lack of leaks discovered by the aerial infrared study
    b. Reportedly high condensate return percentage 80-85% (which we were not able to confirm with trended data, but is based on interview with operations). We recommend trending make-up water use to confirm this recovery percentage.
3. Opportunity for Building Energy Reductions: Based on our review of the campus benchmark values and experience with optimization at the building level, we see an order of magnitude savings between $400,000 to $650,000 per year, representing an annual reduction of 10%-15% of annual costs. We recommend implementing a pilot project to implement building system optimization in 1-2 buildings (with existing metering) and document impact.
4. Cogen plant efficiency and comparison to Sightlines: Contrary to the Sightlines conclusion that "inefficiencies in the cogen plant could explain high consumption" we conclude that efficiencies in the cogen plant mask the inefficiencies of the campus. We observed an electrical efficiency of 29% (compared to the sightlines observed 19%), which is in line with design efficiency.
5. Need for Additional Energy Metering: Exact breakdown of energy use would be more accurate with additional metering and trending of key plant energy flows. Building metering would provide data to develop comprehensive energy roadmap. We recommend expansion of the existing building metering system and consolidation of the metering data into a single information repository.
6. High use of Boilers rather than HRSG: The summer steam is excessively met by the boilers rather than the unfired and fired HRSG, which is a cheaper means of producing steam both because of its improved efficiency compared to the boilers and in substantially reduced natural gas fuel rate. The average summer steam load of 30,000 pounds per hour, based on the rated capacity of the HRSG (43,000 pounds per hour), should be able to be met for the majority of the summer and most of the shoulder seasons without boiler operation.
7. Little summer day/night/weekend steam load variation: There is no reduction in the load for nighttime or weekend periods observed from the hourly steam profiles. One interpretation of this data is that the campus has minimal use of night setbacks, which should be apparent from the trends.

8. Turbine inlet air cooling control valve disconnected: We recommend re-connecting the control valve actuator to maintain a setpoint for the inlet air cooling coil leaving air temperature.
9. Spray Cooling of Turbine Inlet Gas Overcooling: Inlet gas to gas turbines is only necessary to protect the turbine, and is not an energy conservation measure. We recommend further study to identify the design parameters and operating to this temperature, saving energy and water.
10. Plant steam relief vent valve not trended, and possible source of steam loss: We recommend trending the position of the steam vent to confirm that it is not frequently opened except during periods of high load swings.
11. Plant Metering not Trending: As described throughout this report, there are a number of assumptions and calculations that we performed to draw many of the conclusions. Based on similar scopes with other institutions, we have found the use of plant energy metering to be a very valuable tool for this process, as well as, more importantly, a tool for continually monitoring the performance of the systems. We recommend key energy streams and operating parameters be trended. We recommend trending the following plant values:
    - CHW Load Trending (per chiller)
    - Steam Trending (campus, plant)
    - Steam vent valve trending
    - Cogen elec trends, import trends
    - Condensate return trends
    - Equipment Status (CHWP, CWP, Chiller, Boiler, CTs)
    - Amps, KW
    - Flows, pressures, temperatures
    - Valve positions
12. Chilled water plant upgrade project requires close-out: The chilled water plant upgrade project was not fully closed out during our survey and we presume the controls deficiencies observed will be corrected during the close-out process.
13. NJ Clean Energy Large Energy User Program Participation: One of the rebate programs which we have had the success with for gathering funds for similar campuses in New Jersey is the LEUP, which funds: 75% of project cost, $0.33/kwh, $3.75/therm. Recommend further study to quantify opportunities.
14. Economic and Emergency Demand Response Programs: TCNJ typically maintains an import buffer of electricity from 0.5 to 1.5 MW. We recommend further evaluating participation in PJM Economic and/or Emergency Demand Response programs and reducing the electric import buffer by increasing operation of cogen, load shedding building energy, and/or transitioning to steam chillers. Recommend further study to quantify opportunities.

The following is a summary of the measures which were further analyzed to quantify savings:

Table 15 –Financial summary

Breakdown of Modification Options								
Option	kWh Reduction			Natural Gas Reduction		CO2 Reduction	Annual Savings	Notes
	Usage kWh	Demand kW	$	Usage mmbtu	$	Total (Tons CO2e)	Measure Savings	
Measure 1: Maximize use of Duct Firing	NA	NA	NA	12,473	$ 280,000	1,020	$ 280,000	Cost savings comes from both improvement in efficiency (mmbtu savings) and cost savings for reduced gas rate with HRSG gas.
Measure 2: Reduce Summer Steam use:	NA	NA	NA	41,702	$ 274,402	3,411	$ 274,402	Presumes April thru August steam use reduced by an average of 11.5 mmbtu/h
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Measure 4: Increase Compressed Gas Temperature				1,018	$ 4,451	83	$ 4,451	Assumes average temperature increase of 70 degF. Requires further study to confirm upper limit.
Measure 5: Building Optimizaiton	Opportunity for building savings is $450,000 to $650,000 per year							

A APPENDIX

Existing Equipment Overview

A. Central Chilled Water Plant

The chilled water plant at TCNJ has the installed capacity of 6,975 Tons. The detailed existing system information is broken up into four sections below: generating equipment, distribution equipment, utilization equipment and system controls.

Image 11 – Chiller Plant Cooling Towers

The generating equipment is composed of condenser water and chilled water equipment.

i. Condenser Water

The condenser water (CW) is generated by four BAC and four Marley cooling tower cells. These cooling tower cells are induced-draft cross-flow type.

Table 16 –Cooling Tower Data

Tower ID			Cell-1	Cell-2	Cell-3	Cell-4	Cell-5	Cell-6	Cell-7	Cell-8
Location			TCNJ	TCNJ	TCNJ	TCNJ	TCNJ	TCNJ	TCNJ	TCNJ
Service			Condenser Water	Condenser Water	Condenser Water	Condenser Water	Condenser Water	Condenser Water	Condenser Water	Condenser Water
Make			BAC	BAC	BAC	BAC	Marley	Marley	Marley	Marley
Model			33813-2PMWX	33813-2PMWX	33813-2PMWX	33813-2PMWX	NC8413XAS	NC8413XAS	NC8413XAS	NC8413XAS
Serial Number										
Type							Crossflow	Crossflow	Crossflow	Crossflow
Design Specifications	Capacity	Tons	1,254	1,254	1,254	1,254	1,963	1,963	1,963	1,963
	Actual Heat Rejection Capacity	MBH	15,045	15,045	15,045	15,045	23,550	23,550	23,550	23,550
	Flow	GPM	1,700	1,700	1,700	1,700	3,000	3,000	3,000	3,000
	Water Temp Entering/ Leaving	°F	102.7/85.0	102.7/85.0	102.7/85.0	102.7/85.0	100.7/85.0	100.7/85.0	100.7/85.0	100.7/85.0
	Wet Bulb Temp	°F	77.3	77.3	77.3	77.3	77.8	77.8	77.8	77.8
	Speed	RPM	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Power	HP	40	40	40	40	100	100	100	100

ii. Chilled Water

The chilled water is generated by four chillers with the total capacity of 6,760 tons.

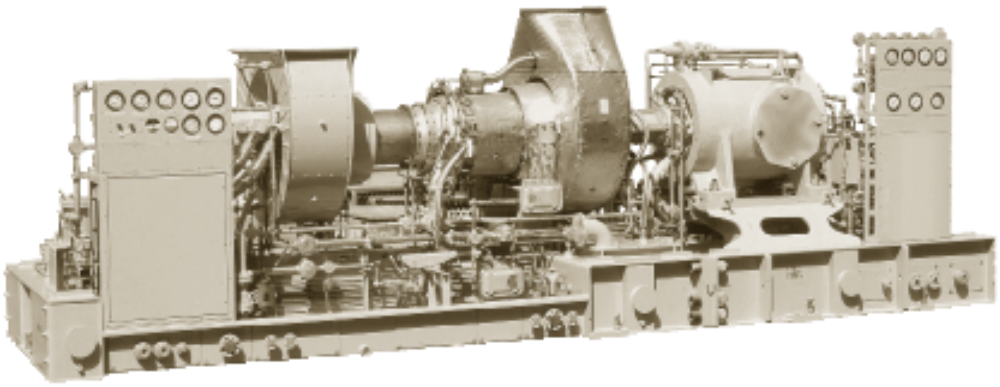
Table 17 – Chiller Data

Chillers						
Chiller ID		**CH-1**	**CH-2**	**CH-3**	**CH-5**
Location		TCNJ	TCNJ	TCNJ	TCNJ
Make		York	York	York	Trane
Model Number		YKVHVDJ4-STES	YKVHVDJ4-STES	YKQDQSK3-DBG	CVRE203UEA01FFB1001141000
Serial Number		GFKM 018848	GFKM 018847	SMCM404900	L16L05549
Nominal Capacity	**Tons**	2,000	2,000	1,480	1280
Efficiency	**kW/Tons**			0.57	0.76
Design Specifications	**Compressor**				
	Type				
	Refrigerant	R-134A	R-134A	R-134A	HCFC-123
	Stages				
	Driver				
	Type	Steam Centrifugal	Steam Centrifugal	Electric Centrifugal	Electric Centrifugal
	Make				
	Power	**kW/HP**	1,518	1,518	821	980
	Evaporator				
	Fluid		Water	Water	Water	Water
	Flow	**GPM**	4,000	4,000	2,965	3,100
	Temp. (E/L)	**°F**	54.0/42.0	54.0/42.0	53.94/42.00	56.46/45.00
	Passes	**No.**	2	2	2	2
	Pressure Drop	**Ft of H2O**	21.5	21.5	22.5	20.6
	Min / Max Flow	**GPM**				
	Condenser					
	Fluid		Water	Water	Water	Water
	Flow	**GPM**	6,000	6,000	4,470	4,500
	Temp. (E/L)	**°F**	85.0/94.32	85.0/94.32	85.00/94.15	85.00/94.44
	Passes	**No.**	2	2	2	2
	Pressure Drop	**Ft of H2O**	20.7	20.7	22.9	26.4
	Min / Max Flow	**GPM**				

Solar Turbines
A Caterpillar Company

TAURUS 60
Gas Turbine Compressor Set

Oil & Gas Applications



General Specifications

***Taurus*™ 60 Gas Turbine**

- Industrial, Two Shaft
- Axial Compressor
  - 12 Stage
  - Variable Inlet Guide Vanes
  - Pressure Ratio: 12.2:1
  - Inlet Airflow: 21.3 kg/sec (47.0 lb/sec)
  - Vertically Split Case
- Combustion Chamber
  - Annular Type
  - Conventional or Lean-Premixed, Dry, Low Emission (*SoLoNOx*™)
  - 12 Fuel Injectors
  - Torch Ignitor System
- Gas Producer Turbine
  - 2 Stage, Reaction
  - Max. Speed: 15,000 rpm
- Power Turbine
  - 2 Stage, Reaction
  - Max. Speed: 14,300 rpm
- Bearings
  - Journal: Tilting Pad
  - Thrust, Active: Tilting Pad
  - Thrust, Inactive: Fixed Tapered Land
- Coatings
  - Compressor: Inorganic Aluminum
  - Turbine Nozzles and Blades: Precious Metal Diffusion Aluminide
- Vibration Transducer Type
  - Velocity
  - Proximity Probes

Key Package Features

- Driver Skid with Drip Pans
- Driven Equipment Skid
  - Compressor
  - Compressor Auxiliary Systems
- 316L Stainless Steel Piping ≤ 4"
- Compression-Type Tube Fittings
- Electrical System Options
  - NEC Class I, Group D, Div. 1
  - CENELEC Zone 1
- *Turbotronic*™ Microprocessor Control System
  - Freestanding Control Console
  - Color Video Display
  - Vibration Monitoring
- Control Options
  - 24-VDC Control Battery/ Charger System
  - Gas Turbine and Package Temperature Monitoring
  - Serial Link Supervisory Interface
  - Turbine Performance Map
  - Compressor Performance Map
  - Historical Displays
  - Printer/Logger
  - Predictive Emissions Monitoring
  - Process Controls
  - Compressor Anti-Surge Control
  - Field Programming
- Start Systems
  - Pneumatic
  - Direct Drive AC
- Fuel System: Natural Gas
- Integrated Lube Oil System
  - Turbine-Driven Accessories
- Oil System Options
  - Oil Cooler
  - Oil Heater
  - Tank Vent Separator
  - Flame Trap
- Axial Compressor Cleaning Systems
  - On-Crank
  - On-Crank/On-Line
  - Stationary Cleaning Tank
- Gearbox (if applicable)
  - Speed Increaser
  - Speed Decreaser
- Air Inlet and Exhaust System Options
- Enclosure and Associated Options
- Factory Testing of Turbine and Package
- Documentation
  - Drawings
  - Quality Control Data Book
  - Inspection and Test Plan
  - Test Reports
  - Operation and Maintenance Instruction Manual

Solar Turbines

A Caterpillar Company

TAURUS 60

Gas Turbine Compressor Set

Oil & Gas Applications

Performance

Output Power	5740 kW (7700 hp)
Heat Rate	11 265 kJ/kW-hr (7965 Btu/hp-hr)
Exhaust Flow	77 880 kg/hr (171,690 lb/hr)
Exhaust Temp.	510°C (950°F)

Nominal Rating – ISO
At 15°C (59°F), sea level

No inlet/exhaust losses

Relative humidity 60%

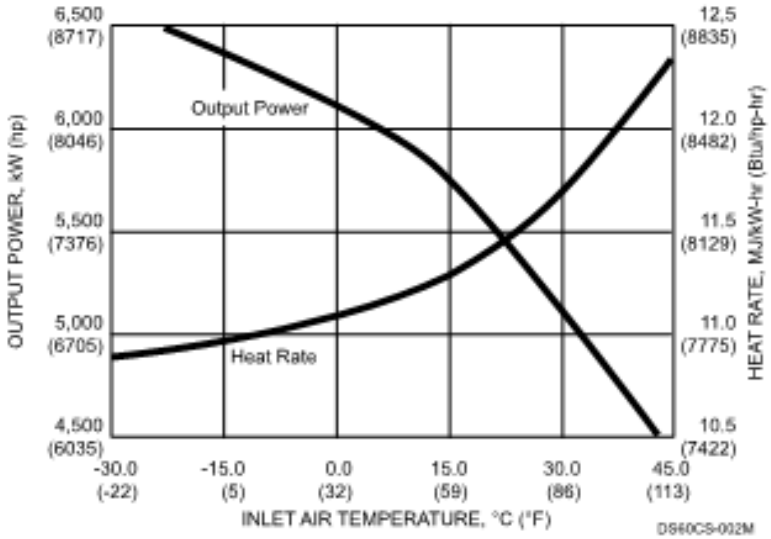
Natural gas fuel with
LHV = 35 MJ/nm³ (940 Btu/scf)

Optimum power turbine speed

AC-driven accessories

Engine efficiency: 32%

Available Power



Package Dimensions*

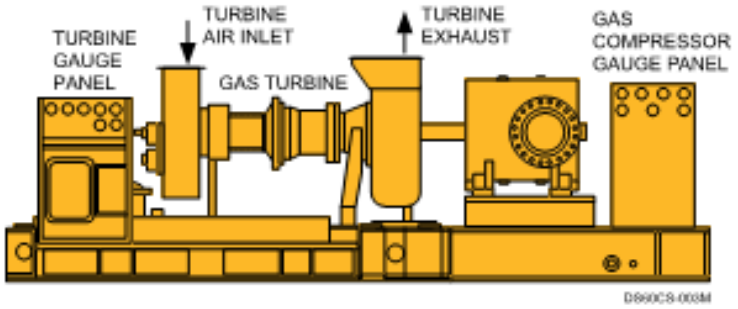
Length: 6.0 m (19' 9")

Width: 2.5 m (8' 1")

Height: 2.7 m (8' 11")

Typical Weight: 15 420 kg (34,000 lb)

**Driver package only*

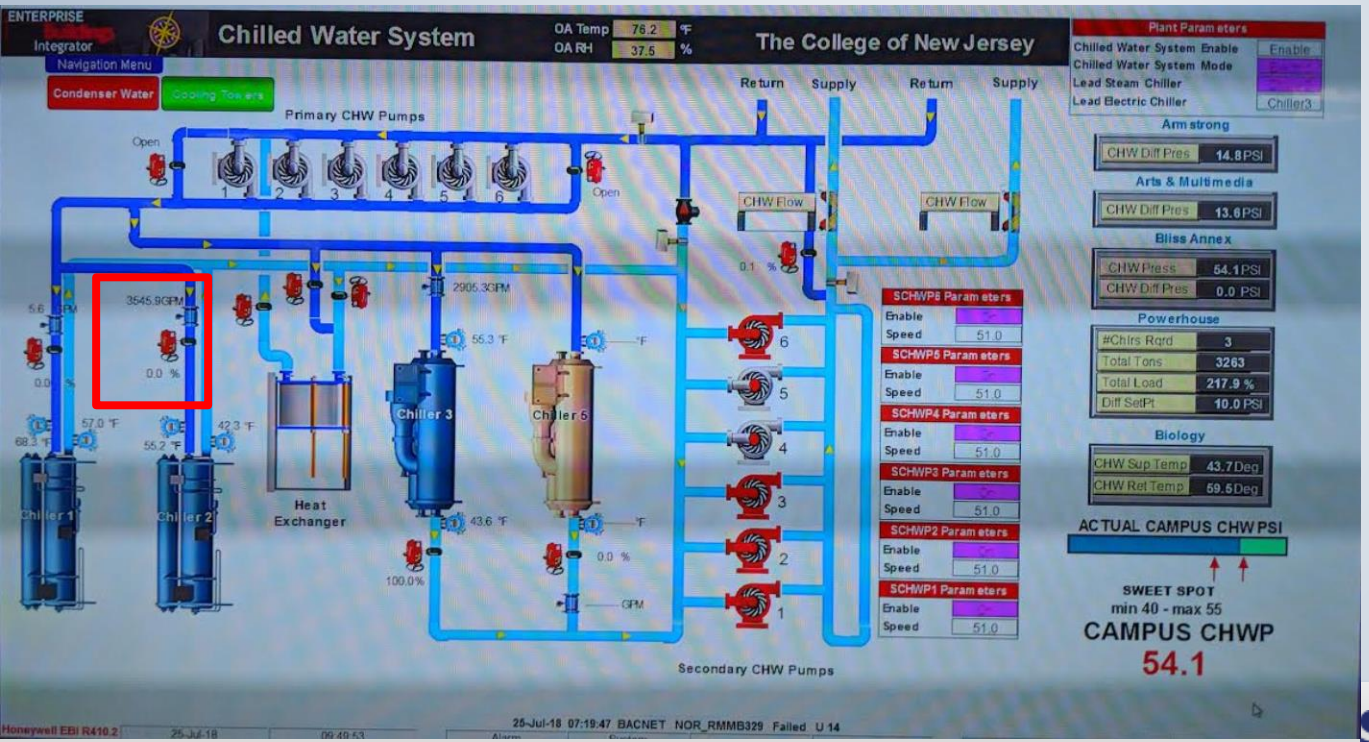


B APPENDIX

Observed Chilled Water Plant Deficiencies

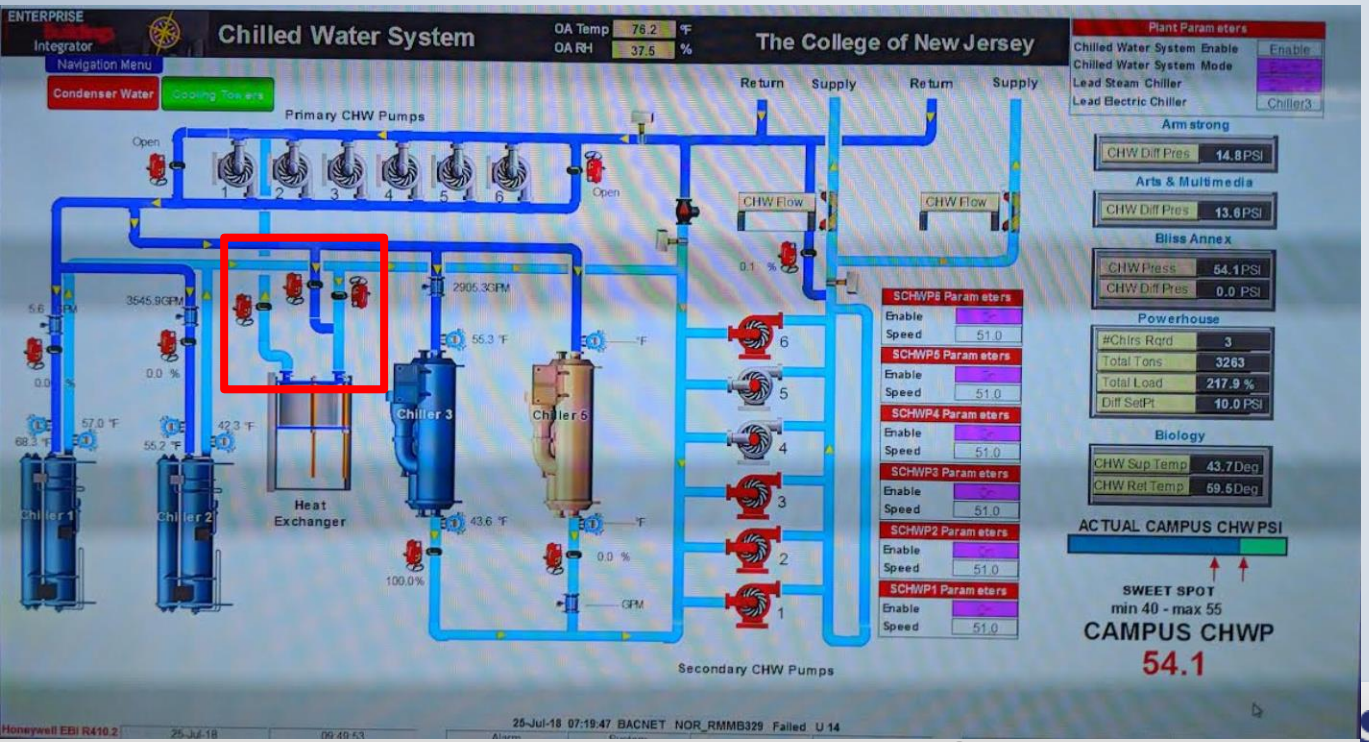
HMI ISSUES

- **Valve is reading closed with 3545 GPM**



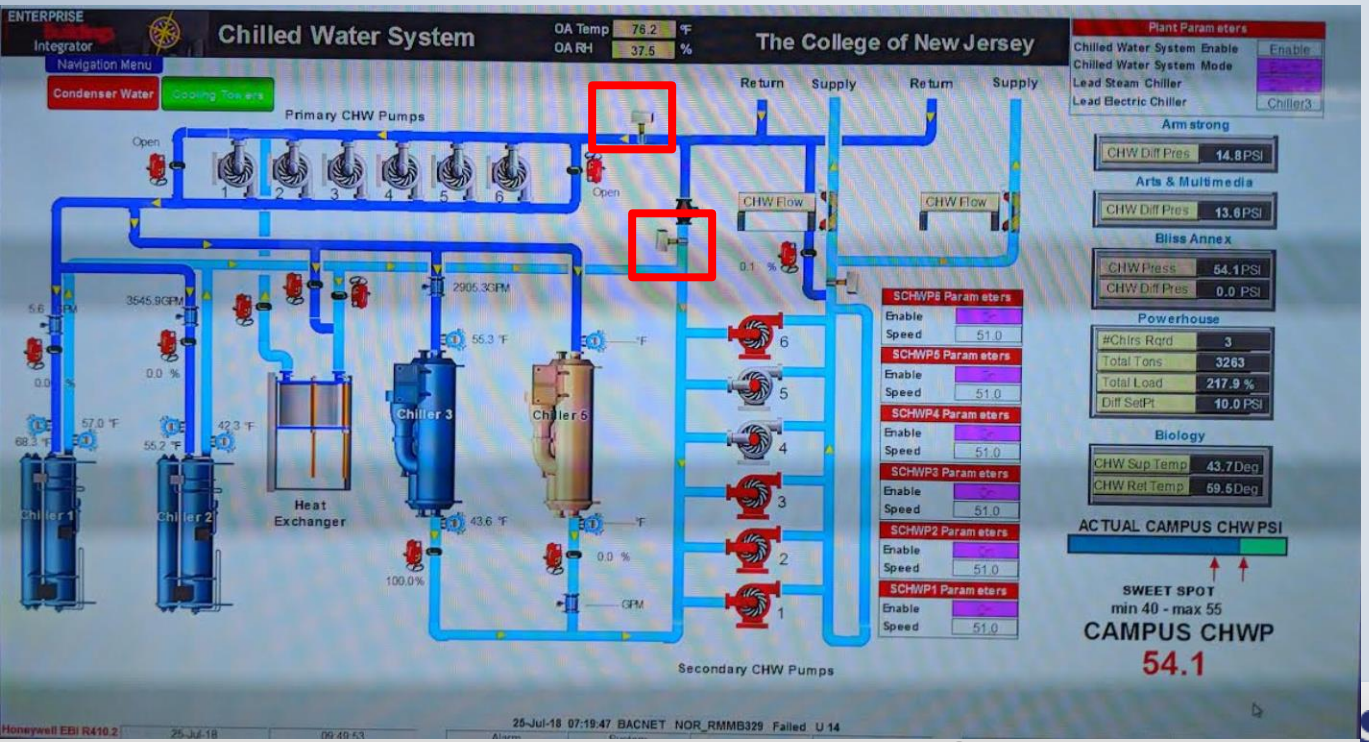
HMI ISSUES

- No valve positions HMI
- No Temperatures on HX?



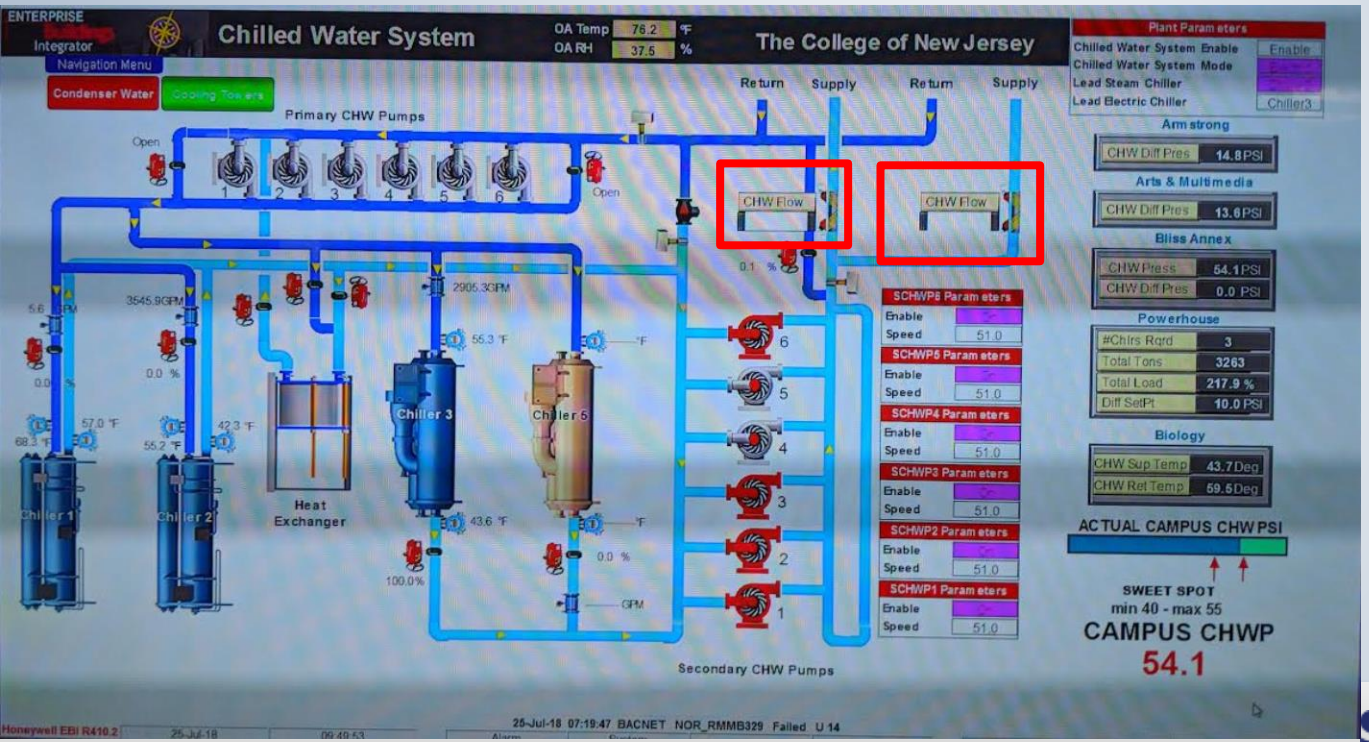
HMI ISSUES

- **What are these symbols? No Data?**



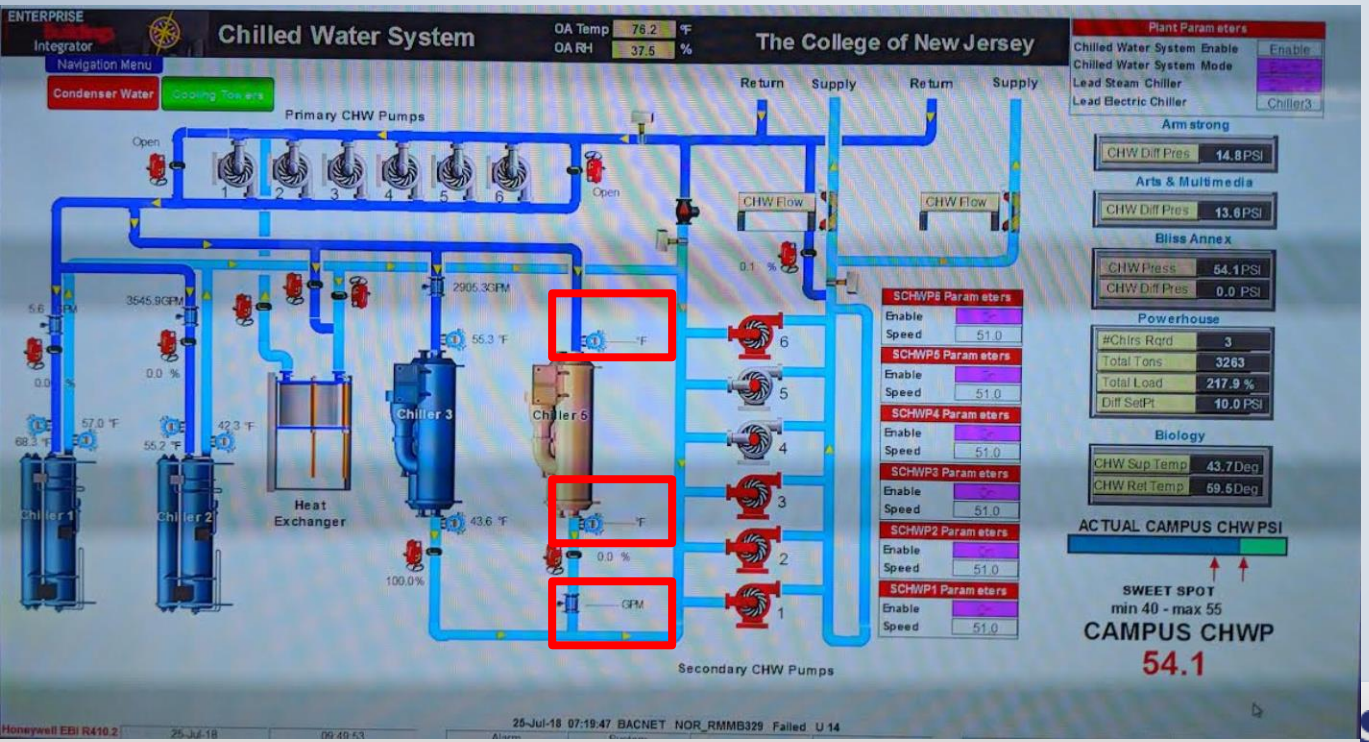
HMI ISSUES

- **No Flow**



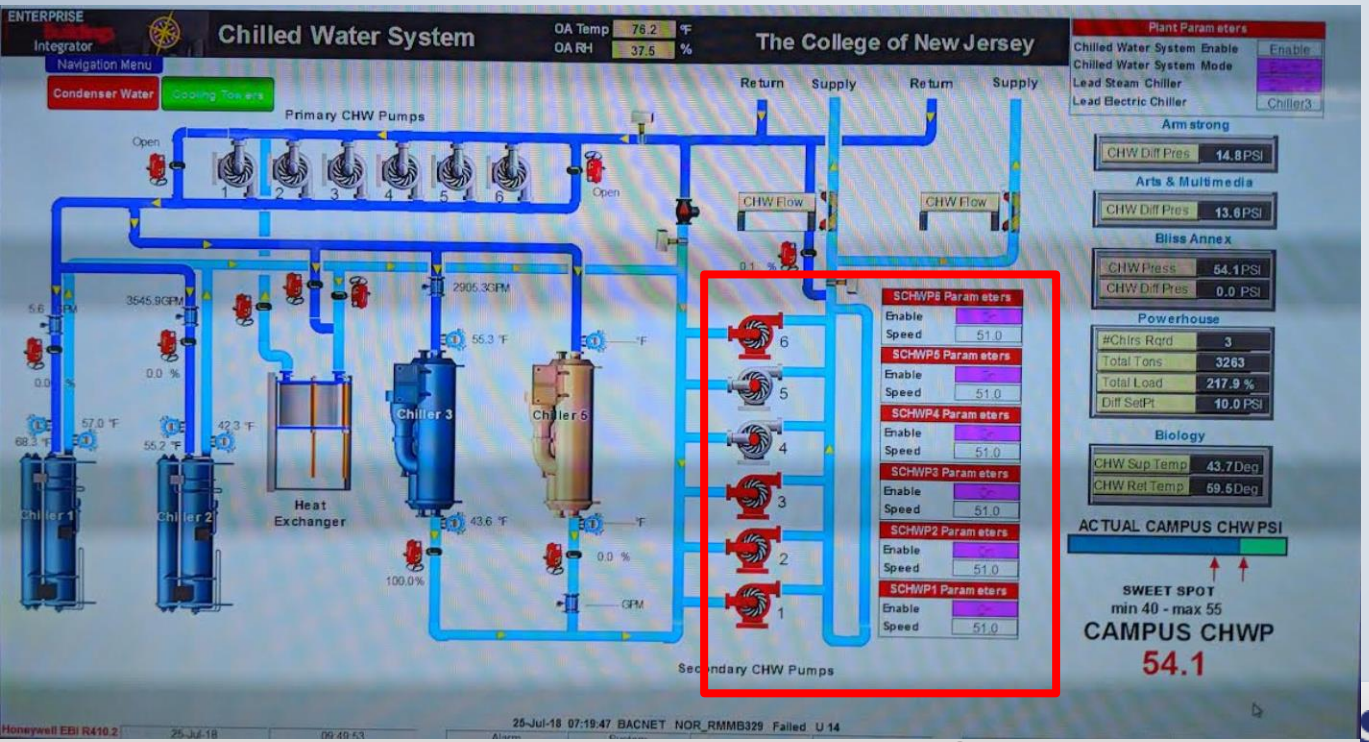
HMI ISSUES

- **Flow meter and temps not working on CH-5**



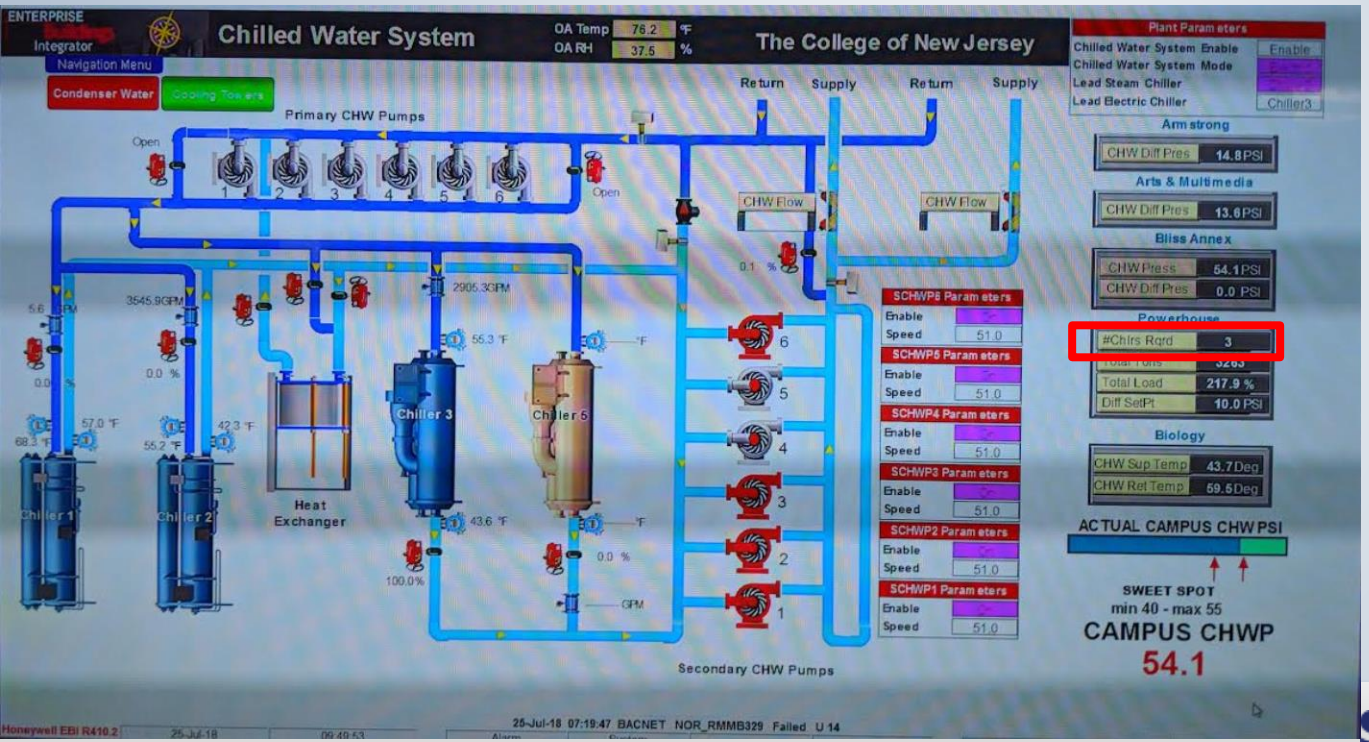
HMI ISSUES

- **Status and pump color not coordinated. All pumps say on while four are red and two are grey.**



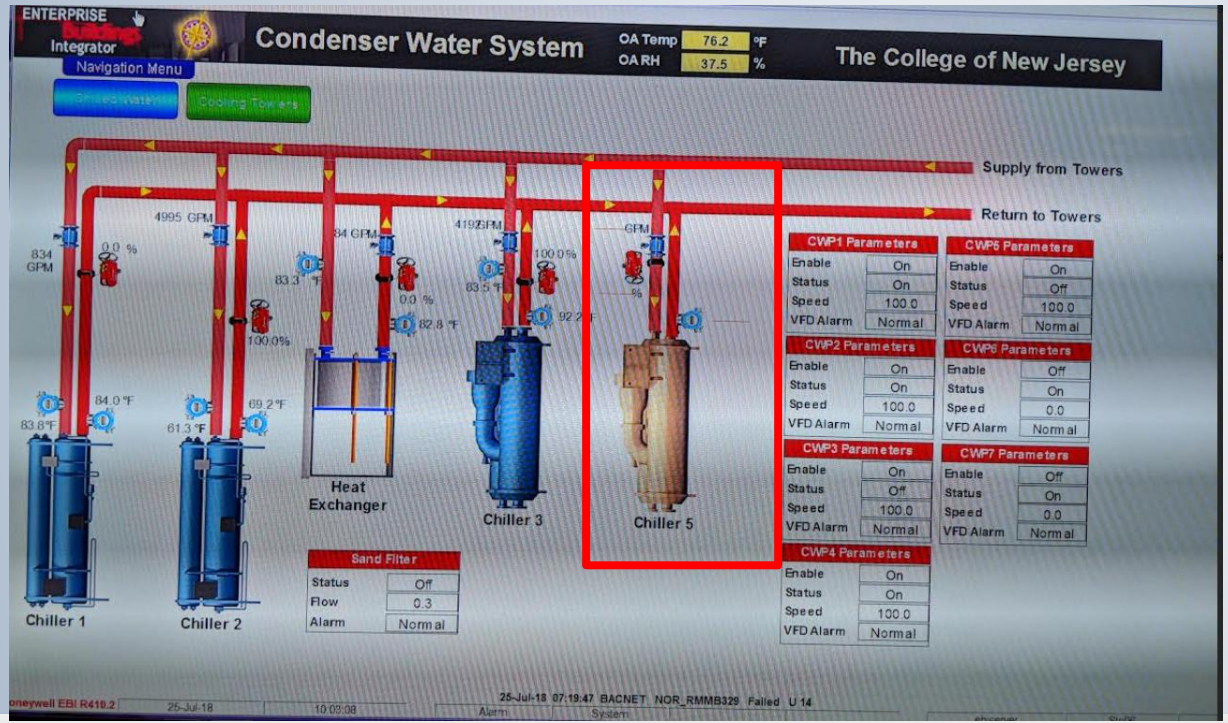
HMI ISSUES

- **Says 3 chillers are required, but two are running, making temp. Unless 5 is running?**



SMITH ENGINEERING

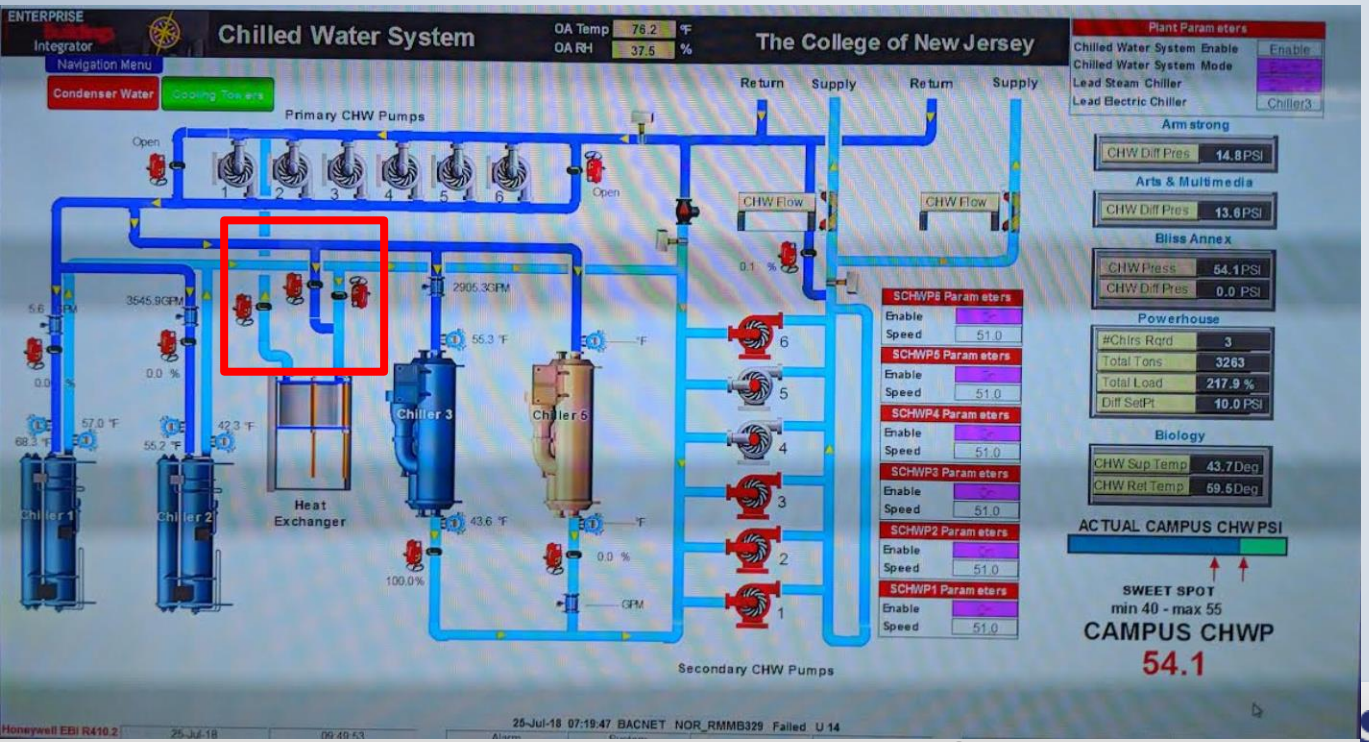
HMI ISSUES



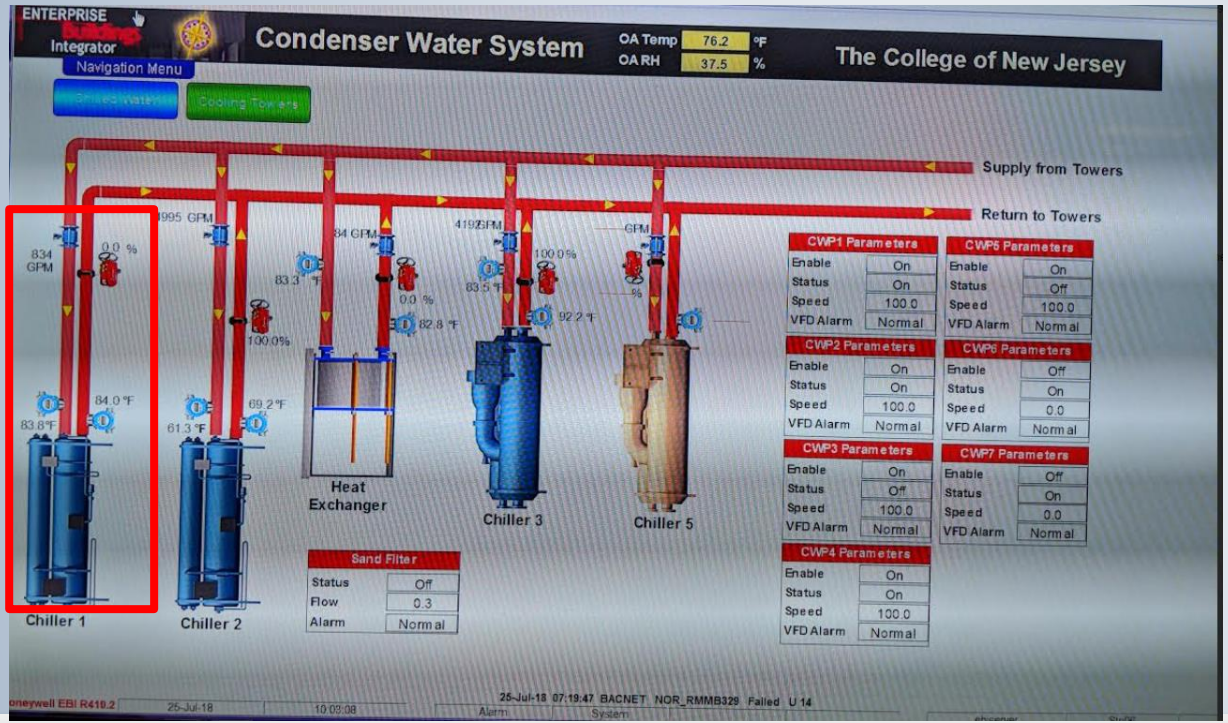
- **Flow meter and temps not working on CH-5**

HMI ISSUES

- **Flow arrows might not be right.**

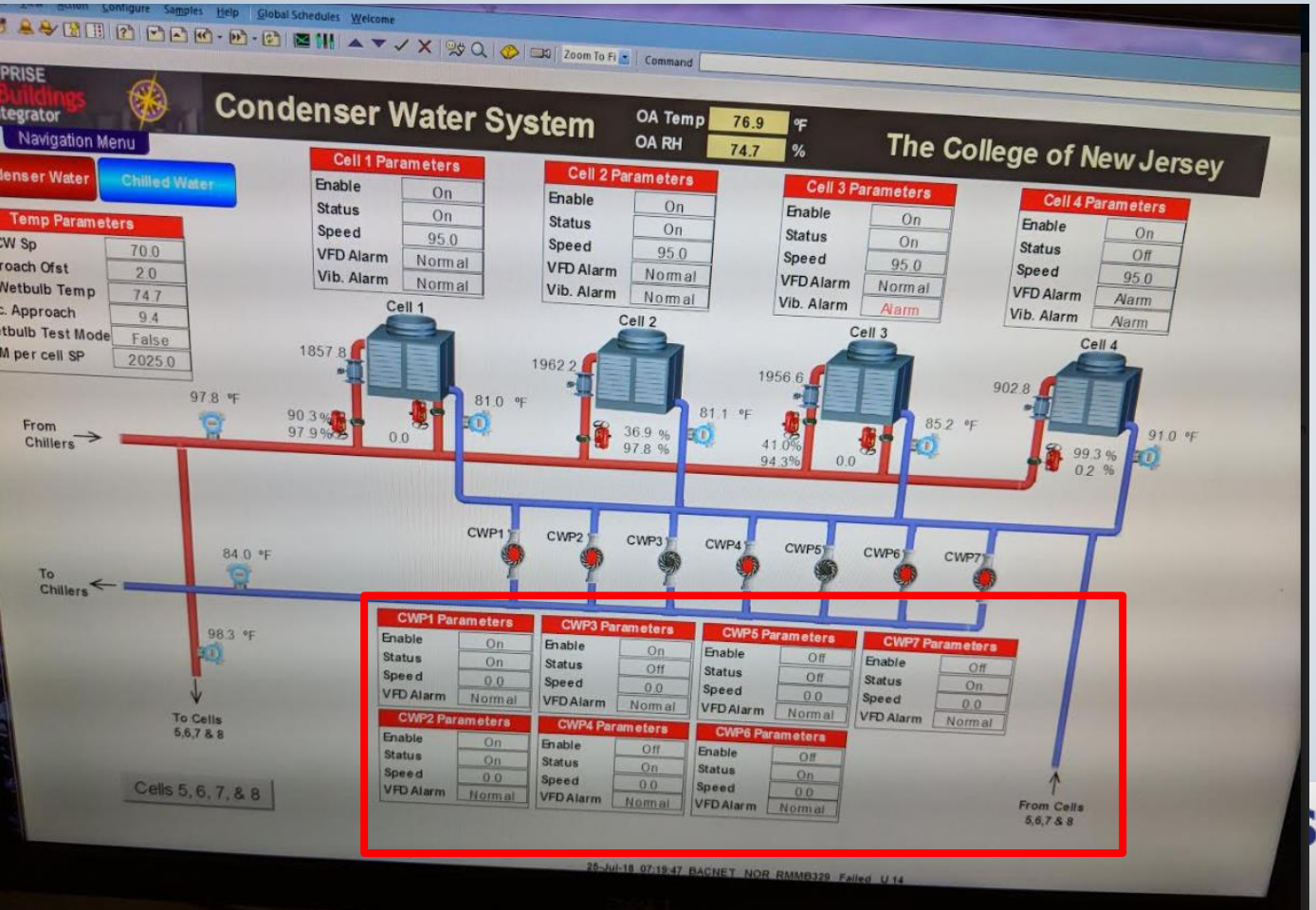


HMI ISSUES



- **Flow on chiller 1 with valve at 0%. Valve position incorrect? Or flow meter incorrect?**

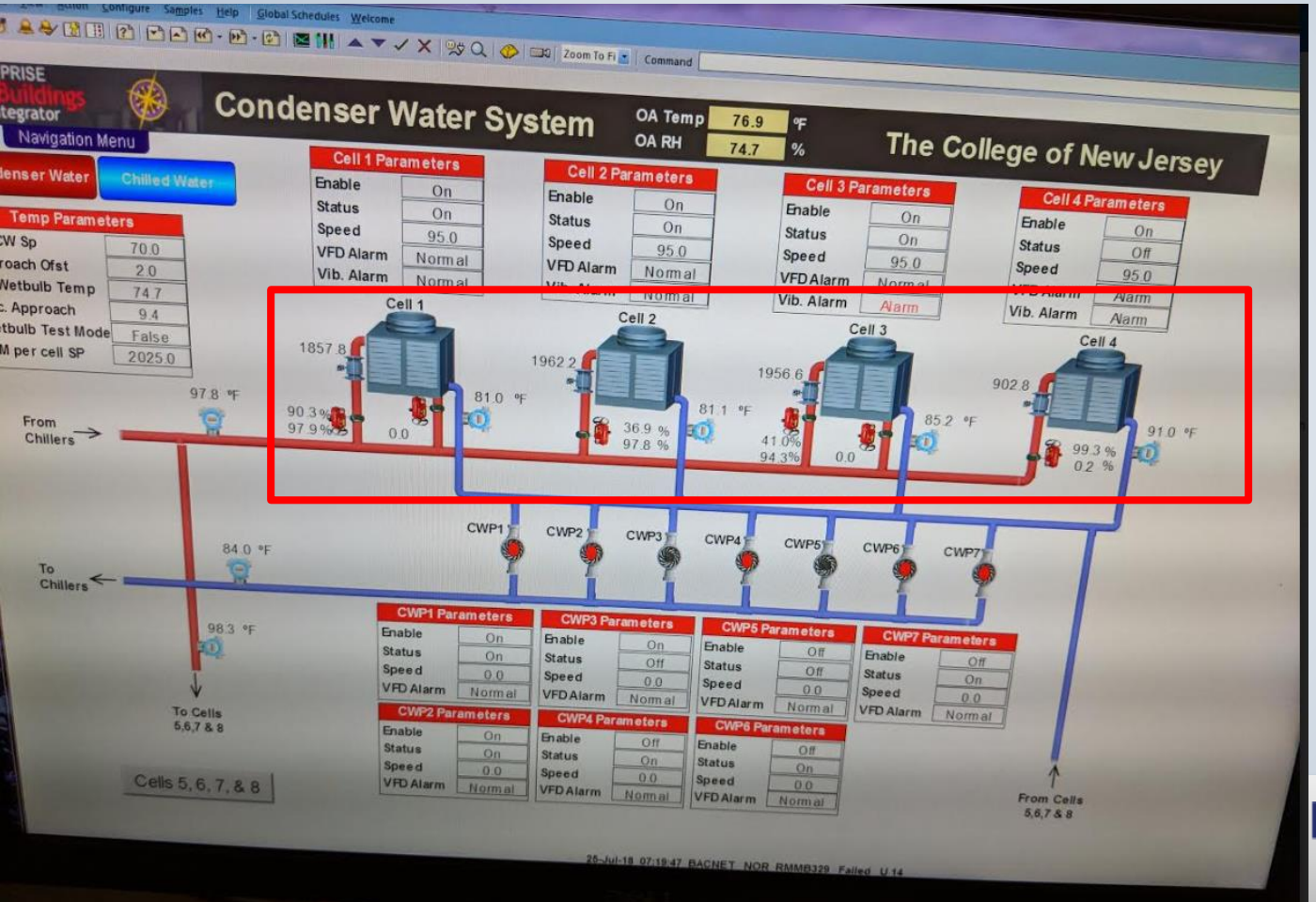
HMI ISSUES



- **Based on this all pumps are at 0% speed**
- **Confirm pump VFDs are integrated**

SMITH ENGINEERING

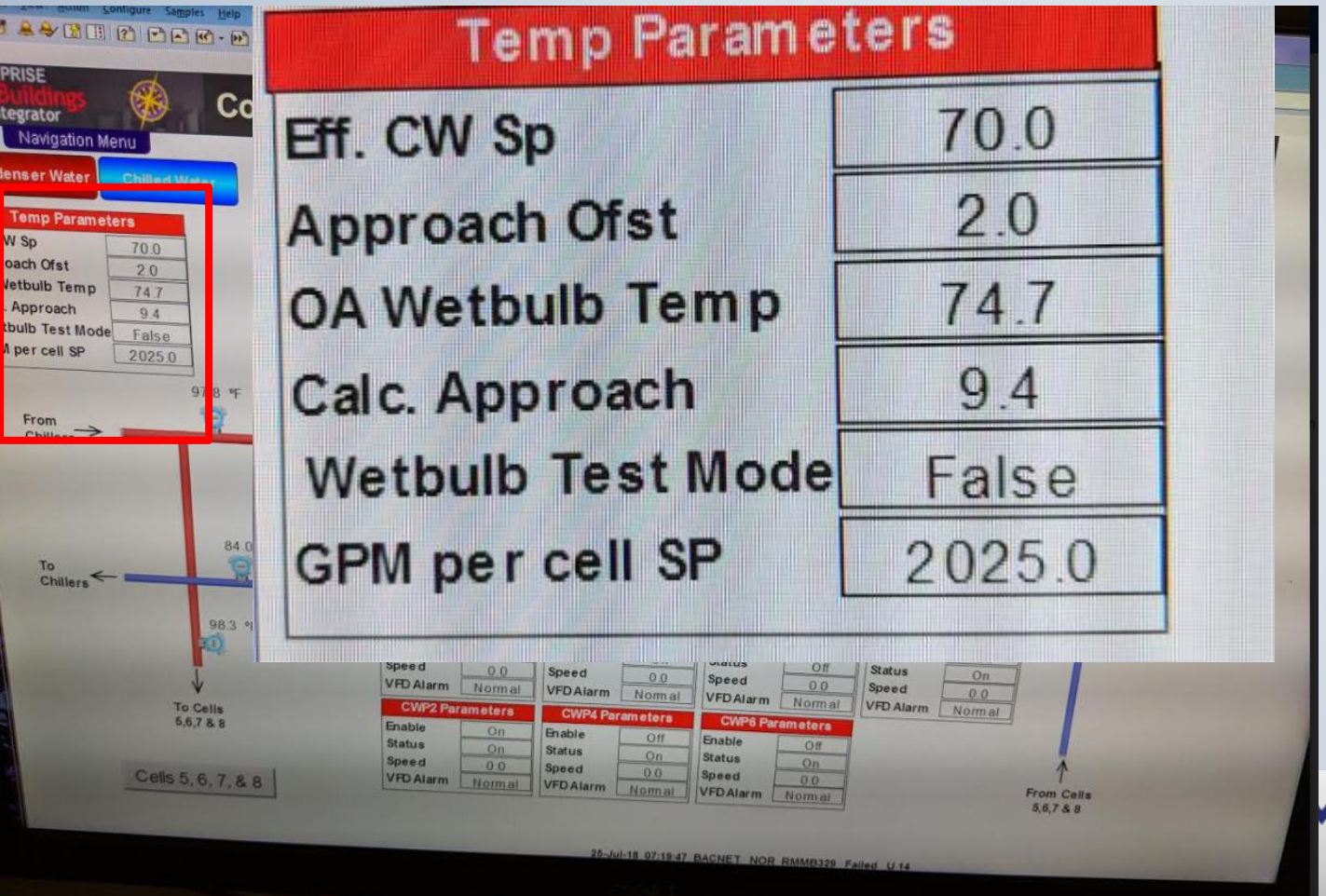
HMI ISSUES



- What are the two %s next to the valves?
- I can assume one is command and one is position. Needs to be labeled to know which is which.
- There is a disparity between the two, this is an issue
- Are the valves trying to control to a flowrate? If so confirm that there are minimums programmed in to prevent full close-off. This is a critical safety.

MITH ENGINEERING

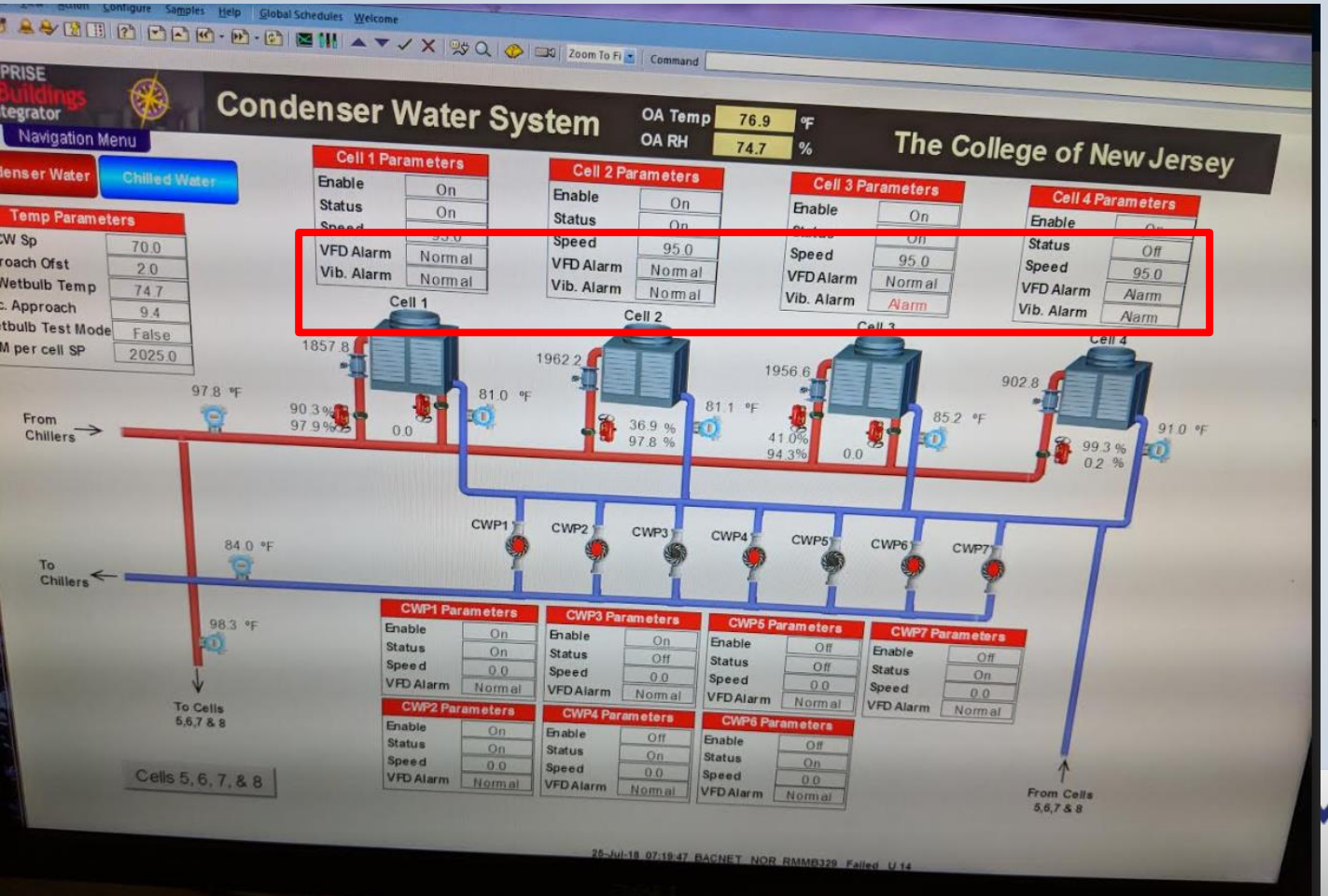
HMI ISSUES



- The CW reset needs to be confirmed with design intent.
- The high approach is due to cell 4 and 5 not running due to alarm. Making very warm water.
- What does WB test mode false mean?
- In this scenario the code should close at least on of the alarmed cells to not pollute the CWST.

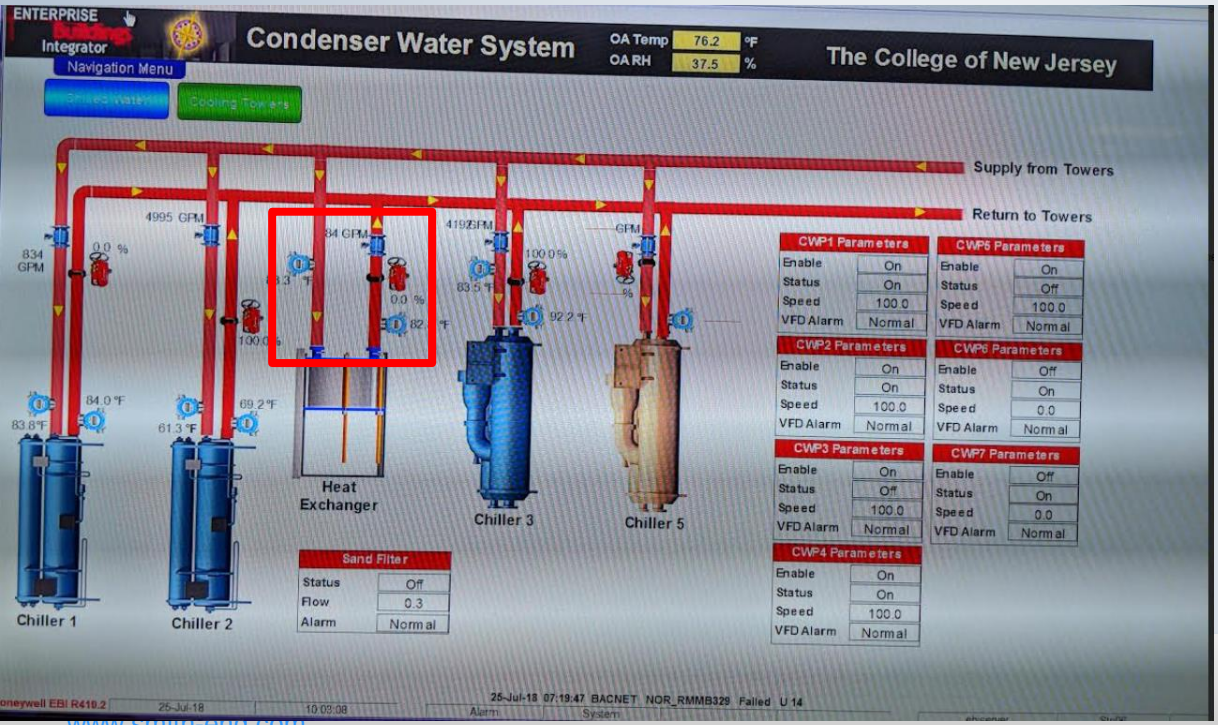
SMITH ENGINEERING

HMI ISSUES



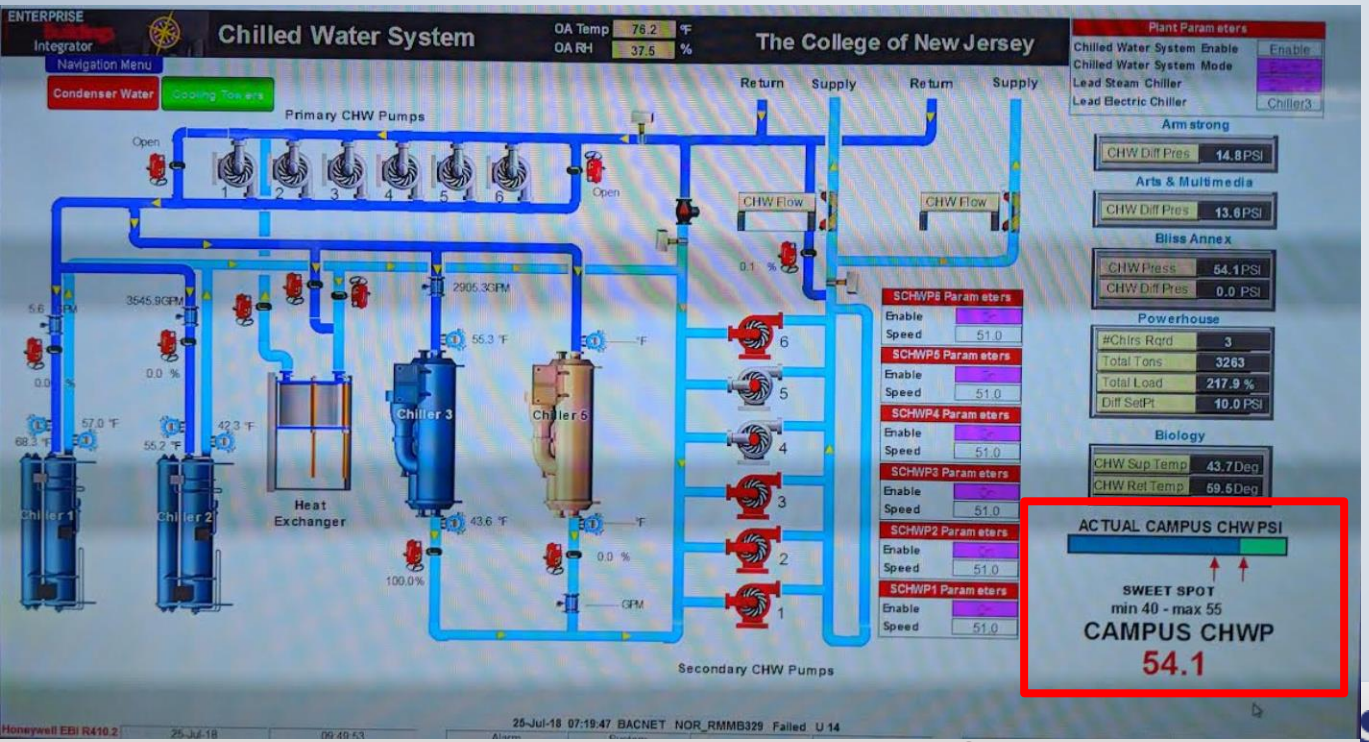
- **The alarm is due to an uncoordinated ramp speed. The PI loop and VFD accel/decel need tunning/coordination. No reason for this to be fast.**

HMI ISSUES



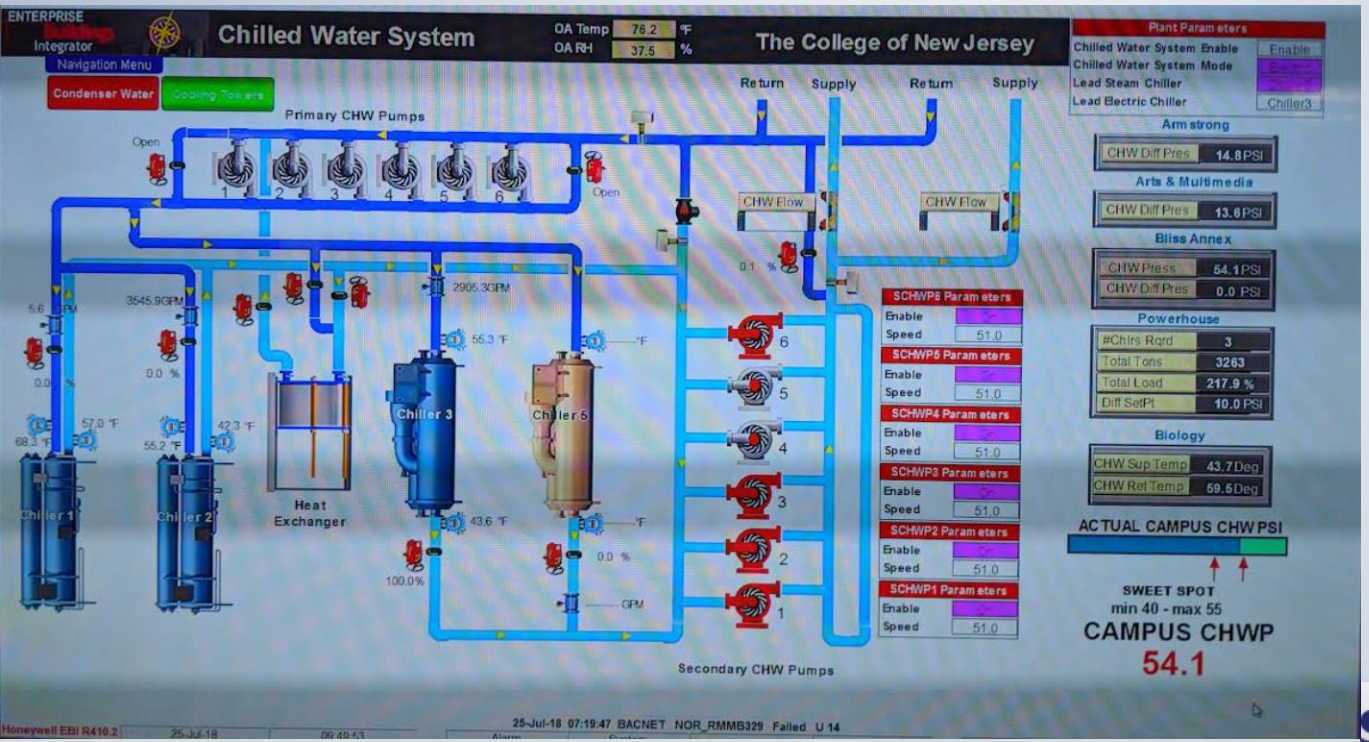
- Once the flow number becomes larger it may overlap the pipe.
- In general the position of data could be cleaned up on all screens.

HMI ISSUES



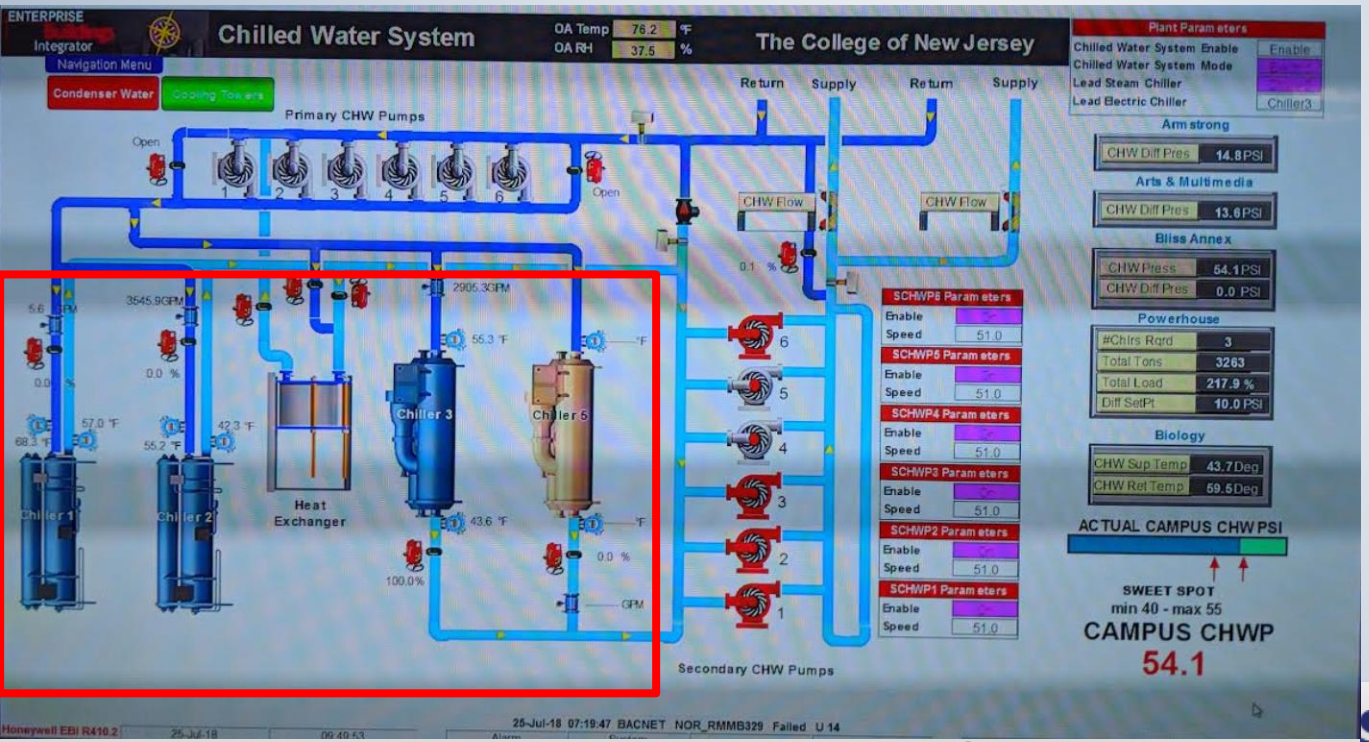
- **Should this read PSID and it is plant differential pressure? The bottom part says “CAMPUS CHWP 54.1”. I think this should read “Campus CHWP DP 54.1 PSID” but then again this is our assumption. Could use clarification.**

HMI ISSUES



- **Would like to see more information if possible on this graphic:**
  - **%RLA on each chiller**
  - **Tons on each chiller and HX**
  - **Chiller on/off**
  - **kW/ton on electric chillers**
  - **CHWP loop output speed command, then separately the feedback from each pump. Which might be the speed shown?**

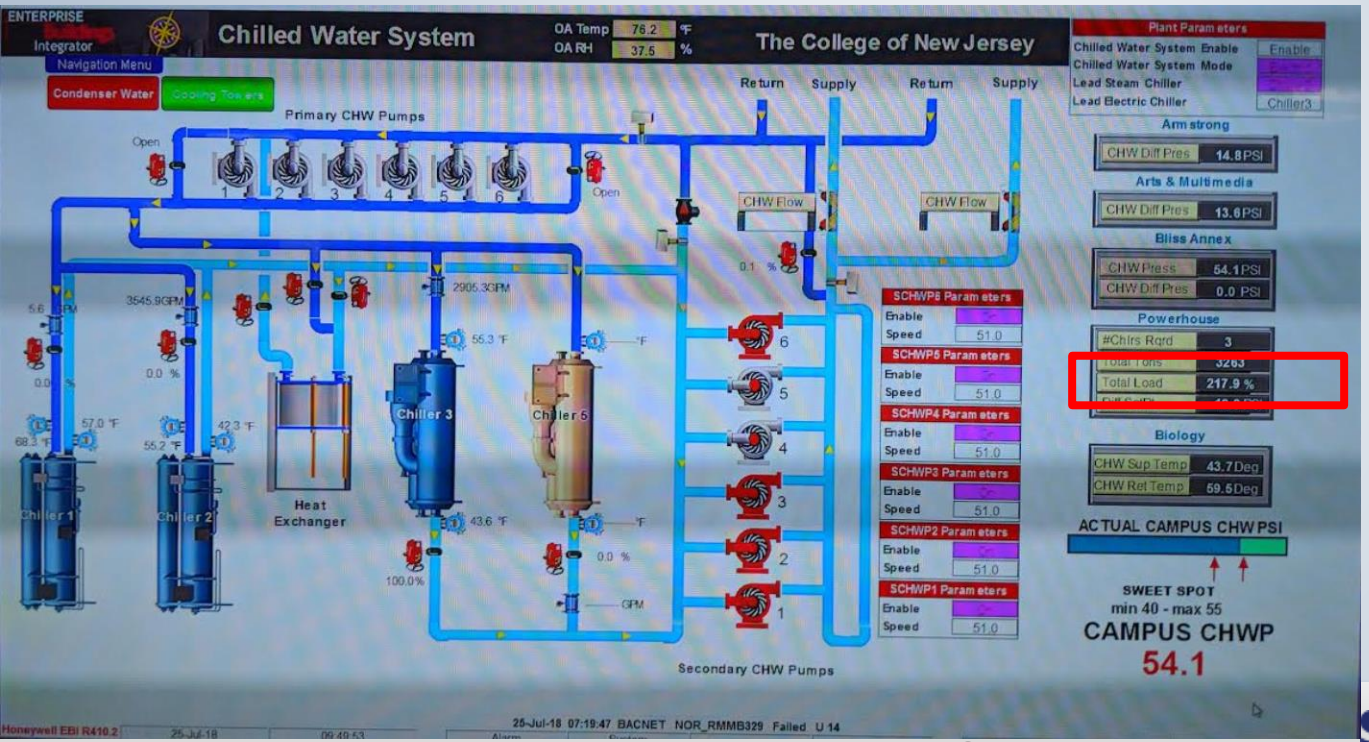
HMI ISSUES



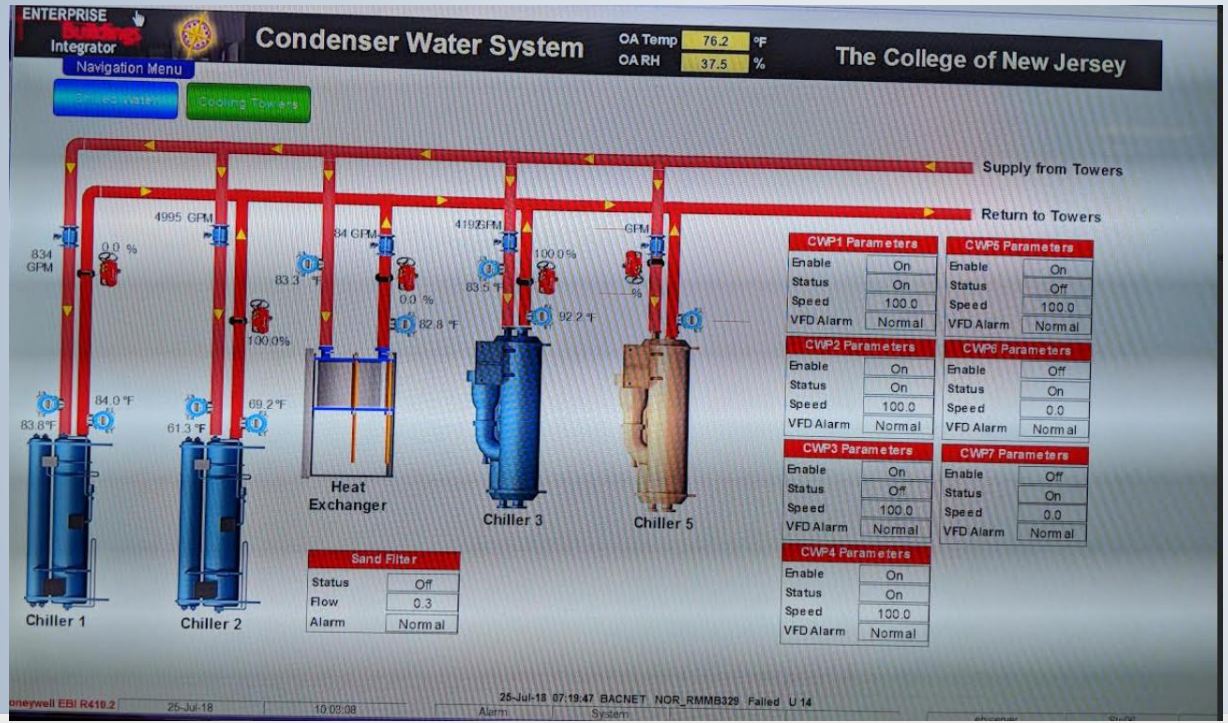
- Is there a meaning to the chiller color Tan VS blue? York vs Trane. It is not on/off. Because CH-1 looks off but is blue.
- Recommend coordinating equipment status with color, like with pumps.

HMI ISSUES

- **How is “total load” a %? Why is it 217.9%? We think we might know, but this could use some clarification.**



HMI ISSUES



- **In general would like to see more KPI.**

Appendix G – Mandatory Forms and Submittals

TCNJ
THE COLLEGE OF NEW JERSEY

Mandatory Documents

FORM #	TITLE OF FORM
1	MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
2	OWNERSHIP DISCLOSURE FORM
3	NON-COLLUSION STATEMENT
4	TWO-YEAR CHAPTER 51/EXECUTIVE ORDER 117 VENDOR CERTIFICATION AND DISCLOSURE OF POLITICAL CONTRIBUTIONS
5	SOURCE DISCLOSURE FORM
6	DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM
7	NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS FORM
8	VENDOR QUALIFICATION SHEET

TCNJ
THE COLLEGE OF
NEW JERSEY

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
FORM # 1

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

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

GOODS, PROFESSIONAL SERVICES AND GENERAL SERVICE 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 limited to the following: employment, upgrading, 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 of the contractor's commitments under this chapter 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.

The contractor or subcontractor agrees to make good faith efforts to meet targeted county employment goals established in accordance with **N.J.A.C. 17:27-5.2**.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, labor unions, that it does not discriminate on the basis of age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personal testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

1. Letter of Federal Affirmative Action Plan Approval
2. Certificate of Employee Information Report
3. Employee Information Report Form AA302 (electronically provided by the Division and distributed to the public agency through the Division's website at http://www.state.nj.us/treasury/contract_compliance)

The contractor and its subcontractor shall furnish such reports or other documents to the Division of Public Contracts Equal Employment Opportunity Compliance as may be requested by the Division 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 Division of Public Contracts Equal Employment Opportunity Compliance for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code at N.J.A.C.17:27.**

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

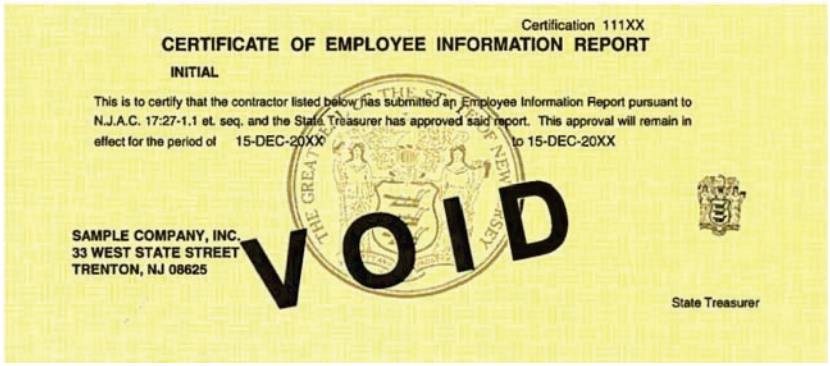
Firm Name:_____

Signature:_____

Title:_____

Date:_____

Sample Certificate of Employee Information Report



OWNERSHIP DISCLOSURE
FORM # 2

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

BID SOLICITATION # AND TITLE: _____

VENDOR NAME: _____

PURSUANT TO N.J.S.A. 52:25-24.2, ALL PARTIES ENTERING INTO A CONTRACT WITH THE STATE ARE REQUIRED TO PROVIDE A STATEMENT OF OWNERSHIP.

1. The vendor is a **Non-Profit Entity**; and therefore, no disclosure is necessary.
2. The vendor is a **Sole Proprietor**; and therefore, no other disclosure is necessary.
   A Sole Proprietor is a person who owns an unincorporated business by himself or her-self.
   A limited liability company with a single member is not a Sole Proprietor.
3. The vendor is a **corporation, partnership, or limited liability company;** and therefore, disclosure is necessary.
   If you answered **YES** to Question 3, you must disclose the following information below: **(a)** the names and addresses of all stockholders in the corporation who own 10% or more of its stock, of any class; **(b)** all individual partners in the partnership who own a 10% or greater interest therein; or, **(c)** all members in the limited liability company who own a 10% or greater interest therein.*

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

4. For each of the corporations, partnerships, or limited liability companies identified in response to Question #3 above, are there any individuals, partners, members, stockholders, corporations, partnerships, or limited liability companies owning a 10% or greater interest of those listed business entities?

   If you answered **YES** to Question 4, you must disclose the following information below: **(a)** the names and addresses of all stockholders in the corporation who own 10% or more of its stock, of any class; **(b)** all individual partners in the partnership who own a 10% or greater interest therein; or, **(c)** all members in the limited liability company who own a 10% or greater interest therein. The disclosure(s) shall be continued until the names and addresses of every non-corporate stockholder, individual partner, and/or member a 10% or greater interest has been identified.*

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

NAME			
ADDRESS			
ADDRESS			
CITY	STATE	ZIP	

5. As an alternative to completing this form, a Vendor with any direct or indirect parent entity which is publicly traded, may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10% or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10% or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10% or greater beneficial interest.*

_____

_____

_____

** Attach additional sheets if necessary*

NON-COLLUSION STATEMENT
FORM # 3

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

Date:

The College of New Jersey
The Office of Finance & Business Services, Purchasing Department
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 Chapter 51
FORM # 4

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

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 use NJSTART (**https://www.njstart.gov/bso/**) to check the status of a vendor's Chapter 51 certification before contacting the Review Unit's mailbox at **CD134@treas.nj.gov**. If the State Agency does not find any Chapter 51 Certification information in NJSTART and/or the vendor is not registered in NJSTART, then the State Agency should 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

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.

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 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.

Two-Year Chapter 51/Executive Order 117 Vendor Certification and Disclosure of Political Contributions
FORM # 4

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

FOR STATE 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 (If the corporation only has one officer, please write "sole officer" after the officer's name.)
- □ 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.

Also Note: "N/A will not be accepted as a valid response. Where applicable, indicate "None."

All Officers of a Corporation or PC	**10% and greater shareholders of a corporation or all shareholders 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.

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. 19:44A-3(n)

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 (Check one box only)

(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 Legisative 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.

SOURCE DISCLOSURE
FORM # 5

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

BID SOLICITATION # AND TITLE: _____

VENDOR NAME: _____

The Vendor/Bidder submits this Form in response to a Bid Solicitation issued by the State of New Jersey, Department of the Treasury, Division of Purchase and Property, in accordance with the requirements of N.J.S.A. 52:34-13.2.

PART 1

☐ All services will be performed by the Contractor and Subcontractors in the United States. Skip Part 2.

☐ Services will be performed by the Contractor and/or Subcontractors outside of the United States. **Complete Part 2.**

PART 2

Where services will be performed outside of the United States, please list every country where services will be performed by the Contractor and all Subcontractors. If any of the services cannot be performed within the United States, the Contractor shall state, with specificity, the reasons why the services cannot be performed in the United States. The Director of the Division of Purchase and Property will review this justification and if deemed sufficient, the Director may seek the Treasurer's approval.

Name of Contractor / Sub-contractor	Performance Location by Country	Description of Service(s) to be Performed Outside of the United States *	Reason Why the Service(s) Cannot be Performed in the United States *

Attach additional sheets if necessary to describe which service(s), if any, will be performed outside of the U.S. and the reason(s) why the service(s) cannot be performed in the U.S.

Any changes to the information set forth in this Form during the term of any Contract awarded under the referenced Bid Solicitation or extension thereof shall be immediately reported by the Contractor to the Director of the Division of Purchase and Property. If during the term of the Contract, the Contractor shifts the location of services outside the United States, without a prior written determination by the Director, the Contractor shall be deemed in breach of Contract, and the Contract will be subject to termination for cause pursuant to the State of New Jersey Standard Terms and Conditions.

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State 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. If I do so, I may be subject to criminal prosecution under the law, and it will constitute a material breach of my contract(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

_____ _____

Signature Date

_____

Print Name and Title

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN
FORM # 6

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

BID SOLICITATION # AND TITLE: _____

VENDOR NAME: _____

Pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must certify that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury's Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf. Vendors/Bidders must review this list prior to completing the below certification. If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take 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.

CHECK THE APPROPRIATE BOX

☐ I certify, pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4), that neither the Vendor/Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List of entities determined to be engaged in prohibited activities in Iran.

OR

☐ I am unable to certify as above because the Vendor/Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List. I will provide a detailed, accurate and precise description of the activities of the Vendor/Bidder, or one of its parents, subsidiaries or affiliates, has engaged in regarding investment activities in Iran by completing the information requested below.

Entity Engaged in Investment Activities _____
Relationship to Vendor/ Bidder _____
Description of Activities _____
_____
_____
Duration of Engagement _____
Anticipated Cessation Date _____

**Attach Additional Sheets If Necessary.*

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State 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. If I do so, I may be subject to criminal prosecution under the law, and it will constitute a material breach of my contract(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

_____ _____
Signature Date

_____
Print Name and Title

CERTIFICATION OF NON-INVOLVEMENT IN PROHIBITED ACTIVITIES IN RUSSIA OR BELARUS
FORM # 7

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

BID SOLICITATION TITLE _____

BID SOLICITATION NO. _____

Pursuant to N.J.S.A. 52:32-60.1, et seq. (P.L. 2022, c. 3) any person or entity (hereinafter "Vendor[i]") that seeks to enter into or renew a contract with a State agency for the provision of goods or services, or the purchase of bonds or other obligations, must complete the certification below indicating whether or not the Vendor is engaged in prohibited activities in Russia or Belarus[ii]. If the Department of the Treasury finds that a Vendor has made a certification in violation of the law, it shall take any 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.

CERTIFICATION

I, the undersigned, certify that I have read the definition of "Vendor" below, and have reviewed the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus, and having done so certify:

(Check the Appropriate Box)

☐ A. That the Vendor is not identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus.

OR

☐ B. That I am unable to certify as to "A" above, because the Vendor is identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia and/or Belarus.

OR

☐ C. That I am unable to certify as to "A" above, because the Vendor, though not identified on the Department of the Treasury's list of Vendors engaged in prohibited activities in Russia or Belarus, is engaged in prohibited activities in Russia or Belarus. A detailed, accurate and precise description of the Vendor's activity in Russia and/or Belarus is set forth below.

Description of Prohibited Activity *(Attach Additional Sheets If Necessary.)*

Additional Certification of Federal Exemption and/or License

(Complete only if appropriate)

☐ D. I, the undersigned, certify that Vendor is currently engaged in activity in Russia and/or Belarus, but is doing so consistent with federal law and/or regulation and/or license. A detailed description of how the Vendor's activity in Russia and/or Belarus is consistent with federal law, or is within the requirements of the federal exemption and/or license is set forth below. *(Attach Additional Sheets If Necessary.)*

Signature of Vendor's Authorized Representative	Date
Print Name and Title of Vendor's Authorized Representative	Vendor's FEIN
Vendor's Name	Vendor's Phone Number
Vendor's Address (Street Address)	Vendor's Fax Number
Vendor's Address (City/State/Zip Code)	Vendor's Email Address

Definitions

[i] Vendor means: (1) A natural person, corporation, company, limited partnership, limited liability partnership, limited liability company, business association, sole proprietorship, joint venture, partnership, society, trust, or any other nongovernmental entity, organization, or group; (2) Any governmental entity or instrumentality of a government, including a multilateral development institution, as defined in Section 1701(c)(3) of the International Financial Institutions Act, 22 U.S.C. 262r(c)(3); or (3) Any parent, successor, subunit, direct or indirect subsidiary, or any entity under common ownership or control with, any entity described in paragraph (1) or (2).

[ii] Engaged in prohibited activities in Russia or Belarus means: (1) companies in which the Government of Russia or Belarus has any direct equity share; (2) having any business operations commencing after the effective date of this act that involve contracts with or the provision of goods or services to the Government of Russia or Belarus; (3) being headquartered in Russia or having its principal place of business in Russia or Belarus, or (4) supporting, assisting or facilitating the Government of Russia or Belarus in their campaigns to invade the sovereign country of Ukraine, either through in-kind support or for profit.

TCNJ
THE COLLEGE OF NEW JERSEY

VENDOR QUALIFICATION SHEET
FORM # 8

The College of New Jersey
PO Box 7718
Ewing, NJ 08628-0718

Vendors are required 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. Vendors must comply with the College's terms and conditions available on the Purchasing website.

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.

All vendors are encouraged to register with the State of New Jersey, Division of Purchase and Property via NJSTART.

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 and personnel that will be responsible for managing contract/service:

   Name: _____

   Title: _____

   Telephone Number: _____

   Email Address: _____

   Street Address: _____

   City/State/Zip: _____

   Federal Identification Number: _____

4. Does your firm have a New Jersey Business Registration Certificate? Yes ☐ No ☐
   If yes, please attach a copy of the certificate. If you would like to register, visit the State website here.

5. Is your firm registered under any of the following categories in the State of New Jersey? **If yes, please attach a copy of the certificate or certification statement from the New Jersey Division of Revenue and Enterprise Services.** If no and you would like to register, please contact the New Jersey Division of Revenue and Enterprise Services at 609-292-2146.

Small Business Enterprise (SBE):	**Yes** ☐	**No** ☐
Women-Owned Business Enterprise (WBE):	**Yes** ☐	**No** ☐
Minority-Owned Business Enterprise (MBE):	**Yes** ☐	**No** ☐
Veteran-Owned Business (VOB):	**Yes** ☐	**No** ☐
Disabled Veteran-Owned Business (DVOB):	**Yes** ☐	**No** ☐

VENDOR QUALIFICATIONS- continued

Under NJ Executive Order 34, TCNJ is responsible for soliciting demographic, ethnic, and gender information from its vendors. 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. 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 (African-American, Hispanic, Asian, and/or Native American) Yes ☐ No ☐

2. Is more than fifty percent (50%) of your company woman owned? 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

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: _____

Email Address: _____

B. Client Name: _____

Contact Name: _____

Telephone Number: _____

Email Address: _____

C. Client Name: _____

Contact Name: _____

Telephone Number: _____

Email Address: _____

VENDOR QUALIFICATIONS- continued

12. Please answer the questions below related to your prior experience If any of the responses are yes, attach a summary of details on a separate sheet.

Has the bidder:

a. been found, though 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? Yes ☐ No ☐

b. 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 or requiring the local unit to look to the bidder's surety for completion of the contract or tender of the costs of completion? Yes ☐ No ☐

c. 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. Yes ☐ No ☐

Firm Name: _____

Signature: _____

Title: _____

Date: _____

Appendix H – General Terms and Conditions

GENERAL TERMS AND CONDITIONS

Unless the vendor is specifically instructed otherwise or specifically deleted on this form, the following terms and conditions apply to all contracts or purchase agreements made with The College of New Jersey. These terms are in addition to any terms and conditions set forth in a solicitation and should be read in conjunction with same unless specifically indicated otherwise. If applicable, these terms and conditions shall also incorporate as if fully set forth herein the attached Rider for Purchases Funded, In Whole or In Part, By Federal Funds. In the event that the vendor would like to present terms and conditions that are in conflict with these terms and conditions or proposes changes or modifications or takes exception to any of The College's terms and conditions, the vendor must present those conflicts in writing prior to the submission of their proposal/bid for the required goods/services. Any conflicting terms and conditions that the College is willing to accept will be reflected in writing. Any cross out or change in the College's terms and conditions at time of proposal/bid submission may be a factor in determining an award of contract or purchase agreement.

Vendors are notified by this statement that all terms and conditions will become a part of any contract or order awarded as a result of a request for proposal whether stated in part, in summary, or by reference. In the event a vendor's terms or conditions conflict with a State law and/or the College's terms and conditions, the State law or College's terms and conditions will prevail.

The vendor's status pursuant to all contracts or purchase agreements shall be that of an independent contractor and not of an employee of The College or the State of New Jersey.

1. *STATE LAW REQUIRING MANDATORY COMPLIANCE BY ALL VENDORS*

1.1 CORPORATE AUTHORITY-N.J.S.A. 14A:13-3 requires that all corporations be authorized to do business in the State of New Jersey. Corporations incorporated out of the State must file a Certificate of Authority with the Secretary of State, Department of State, State House, Trenton, New Jersey.

1.2 ANTI-DISCRIMINATION-All parties to any contract with The College of New Jersey agree not to discriminate in employment and agree to abide by all anti-discrimination laws including those contained in N.J.S.A 10:2-1 through 10:2-4, N.J.S.A. 10:5-1 et seq. and N.J.S.A. 10:5-31 through 10:5-38, and all rules and regulations issued thereunder. The vendor agrees that:

A. In the hiring of persons for the performance of work under this 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 this contract, no contractor, nor any person acting on behalf of such contractor or subcontractor, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

B. No contractor, subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this 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, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;

C. There may be deducted from the amount payable to the contractor by the contracting public agency, under this 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. This contract may be canceled or terminated by the contracting public agency, and all money due or to become due hereunder may be forfeited, for any violation of this section of the contract occurring after notice to the contractor from the contracting public agency of any prior violation of this section of the contract.

1.3 PREVAILING WAGE ACT-The New Jersey Prevailing Wage Act N.J.S.A. 34:11-56.26 et seq. is hereby made a part of every contract entered into on behalf of The College of New Jersey except those contracts which are not within the contemplation of the Act. The vendor's signature on his proposal guarantees that neither the firm nor any subcontractors employed to perform the work covered by his proposal has been suspended or debarred by the Commissioner of the Department of Labor and Workforce Development for violation of the provisions of the Prevailing Wage Act and/or the Public Works Contractor Registration Acts; the vendor's signature on the proposal is also his guarantee that he and any subcontractors he might employ to perform the work covered by his proposal will comply with the provisions of the Prevailing Wage and Public Works Contractor Registration Acts. The College of New Jersey can terminate the contract in the event vendor or any subcontractor violates the Prevailing Wage Act.

1.4 WORKER AND COMMUNITY RIGHT TO KNOW ACT-The provisions of N.J.S.A. 34:5A-1 et seq which require the labeling of all containers of hazardous substances are applicable to this contract. Therefore, all goods offered for purchase to The College must be labeled by the vendor in compliance with the provisions of the Act.

1.5 OWNERSHIP DISCLOSURE-Contracts for any work, goods, or services cannot be issued to any firm unless the firm has disclosed the names and addresses of all its owners holding 10% or more of the firm's stock or interest. Refer to N.J.S.A. 52:25-24.2.

1.6 COMPLIANCE-STATE LAWS-It is agreed and understood that any contracts and/or orders placed as a result of this proposal shall be governed by and construed in accordance with the laws of the State of New Jersey. The laws of the State of New Jersey shall determine the rights and obligations of the parties hereto.

A. Business Registration – Pursuant to N.J.S.A. 52:32-44, the College is prohibited from entering into a contract with an entity unless the entity 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 State Department of the Treasury.

The contractor and any subcontractor providing goods or performing services under the contract, and each of their affiliates, shall, during the term of the contract, 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, P.L. 1966, c. 30 (N.J.S.A. 54:32B-1 et seq.) on all their sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Revenue at (609) 292-1730. Form NJ-REG can be filed online at https://nj.gov/labor/handbook/formdocs/FormIntroNJREG.html

B. Public Works Contractor Registration Act - The New Jersey Public Works Contractor Registration Act requires all contractors, subcontractors and lower tier subcontractors who bid on or engage in any contract for public work as defined in N.J.S.A. 34:11-56.26 be first registered with the New Jersey Department of Labor and Workforce Development. Any questions regarding the registration process should be directed to the Division of Wage and Hour Compliance at (609) 292-9464 or https://www.nj.gov/labor/wagehour/wagehour_index.html.

C. The contractor must comply with all provisions of the Americans With Disabilities Act (ADA), 42 U.S.C. 12101 et seq.

D. Certification and Disclosure of Political Contributions – Pursuant to N.J.S.A. 19:44A-20.14 et seq. (P.L. 2005, c. 51 and EO no. 117), he College is prohibited from entering into contracts exceeding $17,500 with individuals or entities that made certain political contributions. Prior to awarding any contract or agreement, the vendor shall submit the Certification and Disclosure form to The College, for review and approval by the State Treasurer or his designee, certifying that no contributions prohibited by either Chapter 51 or Executive Order 117 have been made by the vendor and reporting all contributions the vendor made during the preceding four years to any political organization organized under 26 U.S.C.527 of the Internal Revenue Code that also meets the definition of a "continuing political committee" within the mean of N.J.S.A. 19:44A-3(n) and N.J.A.C. 19:25-1.7.

E. Political Contribution Disclosure – For any contract exceeding $17,500, with the exception of contracts awarded as a result of the public advertising for bids, the vendor must comply with the requirements of P.L. 2005, c.271.

F. Annual ELEC Disclosure - Contractor is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC),

pursuant to N.J.S.A 19:44A-20.27 (P.L. 2005, c. 271, section 3 as amended) if the contractor receives contracts in excess of $50,000 from a public entity in a calendar year. It is the contractor's responsibility to determine if filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at www.elec.state.nj.us.

G. Compliance Codes - The contractor must comply with NJUCC and the latest NEC70, B.O.C.A. Basic Building code, OSHA and all applicable codes for this requirement. The contractor will be responsible for securing and paying all necessary permits, where applicable.

H. Buy American Act - Pursuant to N.J.S.A 52:32-1 and 52:33-1 et seq., if manufactured items or farm products will be provided under this contract to be used in public work or a public contract, they shall be manufactured or produced in the United States and the vendor shall be required to so certify provided this requirement is not inconsistent with the public interest, the cost not unreasonable, nor the requirement impractical.

I. Service Performed in the U.S. – Under N.J.S.A. 52:34-13.2, all contracts primarily for shall be performed with the United States, except when the Contracting Officer certifies in writing a finding that a required service cannot be provided by a contractor or subcontractor within the United States.

J. Diane B. Allen Equal Pay Act - Pursuant to N.J.S.A. 34:11-56.14, a contractor performing "qualifying services" or "public work" to the State or any agency or instrumentality of the State shall provide the Commissioner of Labor and Workforce Development a report regarding the compensation and hours worked by employees categorized by gender, race, ethnicity, and job category. For more information and report templates see https://nj.gov/labor/equalpay/equalpay.html.

K. Warranty of No Solicitation By Paid Agent - Pursuant to N.J.S.A. 18A:64-6.1, the contractor warrants that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, broker-age or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by the contractor for the purpose of securing business. If a breach or violation of this section occurs, the College shall have the right to terminate the contract without liability or in its discretion to deduct from the contract price or consideration the full amount of such commission, percentage, brokerage or contingent fee.

1.7 COMPLIANCE-LAWS-The vendor must comply with all local, state, and federal laws, rules, and regulations applicable to this contract and to the goods delivered and/or services performed hereunder.

2. ***LIABILITIES***

2.1 LIABILITY-COPYRIGHT-The vendor shall hold and save The College of New Jersey and its officers, agents, students, and employees harmless from liability of any nature or kind for or on account of the use of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in the performance of any contract awarded pursuant to this proposal.

2.2 INDEMNIFICATION-The vendor shall assume all risk of and responsibility for any and all claims, demands, suits, actions, recoveries, judgments, and costs and expenses in connection therewith on account of the loss of life, property, or injury or damage to the person, body or property of any person or persons whatsoever which shall arise from or result directly or indirectly from the work and/or materials supplied under this contract; and additionally agrees to indemnify, defend, and save harmless The College of New Jersey and its officers, agents, students, and employees from and against such proceedings. This indemnification obligation is not limited by, but is in addition to, the insurance obligations contained in this agreement.

2.3 INSURANCE BY THE CONTRACTOR: The insurance shall be of the kinds and in the amounts required in this paragraph, and shall be issued by insurance companies approved to do business in New Jersey. The College of New Jersey, the State of NJ, and the NJ Educational Facilities Authority shall be named as an additional insured on the policies. The Contractor expressly agrees that any insurance protection required by this contract shall in no way *limit* the Contractor's obligations under this 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 this contract or law. The successful vendor shall secure and maintain in force, for the term of the contract, liability insurance as provided herein. The certificate shall not be cancelled for any reason except after 30

days written notification to the Purchasing Department for The College of New Jersey.

A. The insurance to be provided by the successful bidder shall be as follows:

1. Commercial General Liability policy as broad as the standard coverage form currently in use in the State of New Jersey, which shall not be circumscribed by any endorsements limiting the breadth of coverage. The policy shall include an endorsement (broad form) for contractual liability and products liability (completed operations). Limits of liability shall not be less than $1,000,000 per occurrence for bodily injury liability and $1,000,000 per occurrence for property damage liability.

2. Comprehensive General Automobile Liability policy covering owned, non-owned, and hired vehicles with minimum limits of $1,000,000 combined single limits.

3. Worker's Compensation Insurance applicable to laws of the State of New Jersey and Employers Liability Insurance with a limit of not less than $500,000.

4. Professional Liability Insurance (consultants) Consultant must maintain Professional Liability Insurance with minimum limits of liability that shall not be less than a combined single limit of two million dollars ($2,000,000) per claim. The professional liability insurance shall be maintained for a period of not less than two years following the actual completion and acceptance of the Project by The College's Contracting Officer. Should the Consultant change carriers during the term of this contract, it shall obtain from its new carrier an endorsement for retroactive coverage.

B. Upon request, the successful vendor will provide certificates of such insurance to the Purchasing Department prior to the start of the contract and periodically during the course of a multi-year contract.

C. EVIDENCE OF INSURANCE. The Contractor shall when this contract is signed and before beginning the work required under this 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 paragraph, 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 paragraph, and that the policies cannot be canceled except after 30 days written notice to the College.

D. 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 this contract. 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 required under this contract, which are certified by an agent or underwriter to be true copies of the policies issued to the Contractor.

E. 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 this contract. The College, in its sole discretion and for its sole benefit, may use monies retained under this paragraph 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 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.

3. ***TERMS GOVERNING ALL PROPOSALS TO THE COLLEGE OF NEW JERSEY***

3.1 CONTRACT AMOUNT-The amount of any contract negotiated, as a result of this proposal shall not be construed as either the maximum or the minimum amount, which the College shall be obligated to order.

3.2 CONTRACT PERIOD AND EXTENSION OPTION-If, in the opinion of the Contracting Officer it is in the best interest of the College to extend any contract awarded as a result for a period of all or any part of a year, the vendor will be so notified of the intent at least 30 days prior to the expiration date of the existing contract. If the extension is acceptable to the vendor, at the original prices and on the original terms, notice will be given to the vendor by the College's Contracting Officer in writing. Unless otherwise specified in such cases, a new Performance Bond may be required of the vendor on a pro rata basis of the original Performance Bond to cover the period of the extension.

3.3 VENDOR RIGHT TO PROTEST INTENT TO AWARD

A. Except in cases of emergency, vendors have the right to protest the Contracting Officer's award of the contract as announced in the notice of intent to award. Unless otherwise stated, a vendor's protest must be received no later than seven business days after the date on the notice of intent to award. In the public interest, the Contracting Officer may shorten the protest period, but shall provide at least 48 hours for vendors to respond to a proposed award.

B. A protest must be in writing and delivered to the Contracting Officer. It must include the specific grounds for challenging the award.

C. The Contracting Officer shall render the College's decision within 10 days to the protesting vendor.

3.4 TERMINATION OF CONTRACT

A. Change of Circumstances:

1. Where the circumstances or needs of the College significantly change or the contract is otherwise deemed no longer to be in the public interest, the Contracting Officer may terminate the contract.

2. The vendor must, where practicable, be given 30 days written notice and an opportunity to respond.

B. For Cause:

1. Where a vendor fails to perform or comply with a contract, the Contracting Officer may terminate the contract subsequent to ten days written notification to the vendor and an appropriate opportunity for the vendor to respond.

2. When a vendor executes a contract poorly as evidenced by formal complaint, late delivery, and poor performance of service, short-shipping etc., the Contracting Officer may terminate the contract subsequent to ten days written notification to the vendor and an appropriate opportunity for response. In exceptional situations the Contracting Officer may reduce the period of notification and discretional dispense with an opportunity to respond.

C. For Convenience:

1. Notwithstanding any provision or language in this contract to the contrary, the Contracting Officer may terminate at any time, in whole or in part, any contract for the convenience of The College, upon no less than 30 days written notice to the vendor.

D. In the event of termination under this section, the vendor will be compensated for work performed in accordance with the contract, up to the date of termination. Such compensation may be subject to adjustments.

3.5 COMPLAINTS-Where a vendor has a history of performance problems as evidenced by formal complaints and/or contract cancellation for cause pursuant to 3.4.B, that vendor may be bypassed for any future contract awards unless the vendor submits with proposal documentation:

A. An explanation of the past performance difficulties and the reasons for such occurrences.

B. An outline of corrective action taken by the vendor to preclude future recurrences of the same or similar problems in the event the vendor is awarded the contract.

3.6 SUBCONTRACTING OR ASSIGNMENT-The contract may not be subcontracted or assigned by the vendor, in whole or in part, without the prior written consent of the Contracting Officer. Such consent, if granted, shall not relieve the vendor of any of his responsibilities under the contract. In the event that a vendor proposes to subcontract for the services to be performed under the terms of the contract award, it shall be stated in the proposal and a list of subcontractors and an itemization of the subcontract services to be supplied will be attached, for approval prior to award of the contract. Nothing contained in the specifications shall be construed as creating any contractual relationship between a subcontractor and the College.

3.7 PERFORMANCE GUARANTEE OF VENDOR-The vendor hereby certifies that:

A. The equipment offered is standard new equipment, is the manufacturer's latest model in production with parts regularly used for the type of equipment offered and that such parts are all in production and not likely to be discontinued; also, that no attachment or part has been substituted or applied contrary to manufacturer's recommendations and standard practice.

B. All equipment operated by electrical current is UL listed where applicable.

C. All new machines are guaranteed as fully operational for the period stated in the RFP from time of written acceptance by The College. The vendor will render prompt service without charge, regardless of geographic location.

D. Sufficient quantities of parts for the proper service to equipment will be maintained at distribution points and service headquarters.

E. Trained technicians are regularly employed in the territory to provide service and repairs to equipment within 48 hours or a period of time accepted as customary industry practice.

F. Any material/equipment rejected for failure to meet the specifications or requirements of the College shall be immediately replaced by the vendor with properly specified equipment/material. Such replacement shall be completely at the vendor's expense.

G. All services rendered to the College shall be performed in strict and full compliance with the specifications of the contract.

1. A service contract shall not be considered complete until final approval by the College is rendered.

2. Payment for services rendered may not be made until final approval is given by the College.

H. Vendor's obligations under this contract is in addition to the vendor's other expressed or implied assurances under this contract or New Jersey State Law and in no way diminishes any other rights that the College may have against the vendor for faulty material, equipment, or work.

I. Bid and Performance Security

a. Bid Security – If bid security is required, such security must be submitted with the bid in the amount listed in the Request for Proposal, see N.J.A.C. 17: 12- 2.4. Acceptable forms of bid security are as follows:

1. A properly executed individual or annual bid bond issued by an insurance or security company authorized to do business in the State of New Jersey, a certified or cashier's check drawn to the order of The College of New Jersey.

2. The College will hold all bid security during the evaluation process. As soon as is practicable after the completion of the evaluation, the College will:

a. Issue an award notice for those offers accepted by the State;

b. Return all bond securities to those who have not been issued an award notice.

All bid security from contractors who have been issued an award notice shall be held until the successful execution of all required contractual documents and bonds (performance bond, insurance, etc. If the contractor fails to execute the required contractual documents and bonds within thirty (30) calendar days after receipt of award notice, the contractor may be found in default and the contract terminated by the College. In case of default, the College reserves all rights inclusive of, but not limited to, the right to purchase material and/or to complete the required work in accordance with the New Jersey Administrative Code and to recover any actual excess costs from the contractor. Collection against the bid security shall be one of the measures available toward the recovery of any excess costs.

b. Performance Security - If performance security is required, the successful bidder shall furnish performance security in such amount on any award of a term contractor line item purchase, see N.J.A.C. 17: 12- 2.5.
Acceptable forms of performance security are as follows:

1. The contractor shall be required to furnish an irrevocable security in the amount listed in the bid or Request for Proposal payable to The College of New Jersey, binding the contractor to provide faithful performance of the contract.

2. The performance security shall be in the form of a properly executed individual or annual performance bond issued by an insurance or security company authorized to do business in the State of New Jersey, a certified or cashier's check drawn to the order of The College of New

New Jersey.

The Performance Security must be submitted to the College within 30 days of the effective date of the contract award and cover the period of the contract and any extensions thereof. Failure to submit performance security may result in cancellation of contract for cause pursuant to provision 3.5b,1, and nonpayment for work performed.

3.8 DELIVERY GUARANTEES-Deliveries shall be made at such time and in such quantities as ordered in strict compliance with the conditions contained in the contract. The vendor shall be responsible for the delivery of material in first class condition and in accordance with good commercial practice. Items delivered must be strictly in accordance with bid specifications. In the event delivery of goods or services is not made within the time frame specified or under the schedule stipulated in the specifications, the College may obtain the goods or services from any available source and the difference in price, if any, will be paid by the vendor failing to fulfill the commitment.

3.9 RIGHT TO INSPECT VENDOR'S FACILITIES-The College reserves the right to inspect the vendor's establishment before making an award, for the purposes of ascertaining whether the vendor has the necessary facilities for performing the contract. The College may also consult with clients of the bidder during the evaluation of bids. Such consultation is intended to assist the College in making a contract award which is most advantageous to the College.

3.10 RIGHT TO FINAL ACCEPTANCE-The College reserves the right to reject all bids, or to award a contract in whole or in part if of the College determines it is the most advantageous to the College, price and other factors considered. In case of tie bids, the contract shall be awarded at the discretion of the Contracting Officer to the vendor or vendors best meeting all of the specifications and conditions.

3.11 MAINTENANCE OF RECORD-The vendor shall maintain records for products and/or services delivered against the contract for a period of three (3) years from the date of final payment. Such records shall be made available to the College upon request.

3.12 Extension of Contract to Other Institutions – It is understood and agreed that in addition to The College of New Jersey, other New Jersey higher education institutions may also participate in this contract at the same pricing, terms, etc.

3.13 MERGERS, ACQUISITIONS - If, during the term of this contract, the contractor shall merge with or be acquired by another firm, the contractor shall give notice to the College as soon as practicable and in no event longer than thirty (30) days after said merger or acquisition. The contractor shall provide such documents as may be requested, which may include but need not be limited to the following:

a. Corporate resolutions prepared by the awarded contractor and new entity ratifying acceptance of the original contract, terms, conditions and prices.
b. updated information including ownership disclosure and Federal Employer Identification Number

3.14 Right to Request further Information-The College reserves the right to request all information which may assist in making a contract award, including factors necessary to evaluate the bidder's financial capabilities to perform the contract. Further the College reserves the right to request a bidder to explain, in detail, how the bid prices were determined.

3.15 BID ACCEPTANCES AND REJECTIONS - The College reserves the right to waive minor elements of non-compliance or reject bids in accordance with law.

4. ***TERMS RELATING TO PRICE QUOTATION***

4.1 PRICE FLUCTUATIONS DURING CONTRACT-Unless otherwise noted by the College, all prices quoted shall be firm and not be subject to increase during the period of the contract. In the event of a manufacturer's price decrease during the contract period, the College shall receive the full benefit of such price reduction on any subsequent orders for goods or services. The Purchasing Department must be notified in writing of any price reduction within five (5) days of the effective date.

Failure to report price reductions may result in cancellation of contract for cause.

4.2 DELIVERY COSTS-Unless noted otherwise in the specification, all quoted prices shall include delivery F.O.B. Destination. The vendor shall assume all liability and responsibility for the delivery of merchandise in good condition to The College of New Jersey or any other location specified by the contract. F.O.B. Destination shall be interpreted as platform delivery to the Receiving Department of the College or other receiving point indicated in the contract. In certain instances

spot deliveries may be specified and required. No additional freight charges will be payable for transportation costs resulting from partial shipments made for the vendor's convenience when a single shipment is ordered.

4.3 COD TERMS-Unless otherwise stated COD terms are not acceptable and such contingency shall constitute just cause for automatic rejection of a bid.

4.4 TAX CHARGES-The College of New Jersey is exempt from the New Jersey sales or use tax pursuant to Section 9(a)(1) of the New Jersey Sales and Use Tax Act N.J.S.A. 54:32B-1 et seq. Additionally, the College is exempt from Federal Excise Tax. An exemption certificate or number is not required for The College of New Jersey to make tax-exempt purchases. Official requests on College letterhead or official purchase orders signed by a qualified officer is sufficient proof for the vendor of exemption from paying the sales tax. Vendors should not include tax charges in their price quotations or on subsequent invoices for purchased goods or services. The College's Federal Employer Identification Number is 222797398.

4.5 PAYMENT TO VENDORS-Payments for goods and/or services purchased by the College will only be made after receipt of contracted items and approval of the invoice for payment.
The College obligation hereunder is contingent upon the availability of appropriated funds from which payment for contract purposes can be made.

New Jersey Prompt Payment Act –The New Jersey Prompt Payment Act N.J.S.A. 52:32-32 et seq. requires state agencies to pay for goods and services within sixty (60) days of the agency's receipt of a properly executed invoice or within sixty (60) days of receipt and acceptance of goods and services, whichever is later. Properly executed performance security, when required, must be received by the College prior to processing any payments for goods and services accepted by the College. Interest will be paid on delinquent accounts at a rate established by the State Treasurer. Interest will not be paid until it exceeds $5.00 per properly executed invoice.

Cash discounts and other payment terms included as part of the original agreement are not affected by the Prompt Payment Act.

4.6 CASH DISCOUNTS-Cash discounts for periods of less than 21 days will not be considered as factors in the award of contracts. For purposes of determining the College's compliance with any discount offered:

A. A discount period shall commence on the date of a properly executed vendor invoice for products and services that have been duly accepted by the College in accordance with terms, conditions and specifications of a valid Contract/Purchase Order. If the invoice is received prior to delivery of the goods or performance of services, the discount period begins with the receipt and acceptance of the goods or completion of services.

B. The date of the check issued by the College in payment of an invoice shall be deemed the date of the College’s response to an invoice for cash discount purposes.

5. FORCE MAJEURE

If, because of force majeure, either party hereto is unable to carry out any of its obligations under this contract, other than the obligations to pay money due hereunder, and if such party promptly gives to the other party hereto written notice of such force majeure, then the obligations of the party giving such notice shall be suspended to the extent made necessary by such force majeure and during its continuance, provided that the party giving such notice shall use its best efforts to remedy such force majeure insofar as possible with all reasonable dispatch. The term "force majeure" as used herein shall mean any causes beyond the control of the party affected thereby, such as, but not limited to, acts of God, act of public enemy, insurrections, riots, strikes, lockouts, labor disputes, fire, explosions, floods, breakdowns, or damage to plants, equipment or facilities, embargoes, orders, or acts of civil or military authority, or other causes of a similar nature. Upon the cessation of the force majeure event, the party that had given original notice shall again promptly give notice to the other party of such cessation.

6. STANDARDS PROHIBITING CONFLICTS OF INTEREST - The following prohibitions on vendor activities shall apply to all contracts or purchase agreements made with the State of New Jersey, pursuant to Executive Order No. 189 (1988).

a. No vendor shall 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 such vendor 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 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.

b. 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 vendor to the Attorney General and the Executive Commission on Ethical Standards.

c. No vendor may, 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 such vendor to, any State officer or employee or special 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: 130-13g. Any relationships subject to this provision 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.

d. No vendor shall 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.

e. No vendor shall 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 vendor or any other person.

f. The provisions cited above in paragraph 6a through 6e shall not be construed to prohibit a State officer or employee or Special State officer or employee from receiving gifts from or contracting with vendors 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 under paragraph 6c.

NOTICE TO ALL BIDDERS SET-OFF FOR STATE TAX NOTICE - Please be advised that, pursuant to N.J.S.A. 54:49-19, and notwithstanding any provision of the law to the contrary, whenever any taxpayer, partnership or S corporation under contract to provide goods or services or construction projects to the State of New Jersey or its agencies or instrumentalities, including the legislative and judicial branches of State government, is entitled to payment for those goods or services at the same time a taxpayer, partner or shareholder of that entity is indebted for any State tax, the Director of the Division of Taxation shall seek to set off that taxpayer’s or shareholder’s share of the payment due the

taxpayer, partnership, or S corporation. The amount set off shall not allow for the deduction of any expenses or other deductions which might be attributable to the taxpayer, partner or shareholder subject to set-off under this act.

The Director of the Division of Taxation shall give notice to the set-off to the taxpayer and provide an opportunity for a hearing within 30 days of such notice under the procedures for protests established under R.S. 54:49-18. No requests for conference, protest, or subsequent appeal to the Tax Court from any protest under this section shall stay the collection of the indebtedness. Interest that may be payable by the State, pursuant to P.L. 1987, c.184 (c.52:32-32 et seq.), to the taxpayer shall be stayed.

APPLICABLE LAW - This contract is subject to New Jersey law, including but not limited to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq. and the New Jersey Tort Claims Act, N.J.S.A. 59:l-1, et seq. This Agreement and all matters or issues collateral to it, shall be governed by and construed in accordance with the law of the State of New Jersey, without regard to its conflict of law provisions.