



Campus Fire Alarm Project  
Fire Alarm Cable Infrastructure,  
Hardware and Software Upgrades

TCNJ Advertised Bid # AB200033

**PROJECT REQUIREMENTS**

**SCOPE OF WORK**

**DRAWINGS**

**May 23, 2020**



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

To be published on **May 23, 2020**. Contact person regarding placement of ad is Roselle Horodeski (609) 771-2894.

**THE COLLEGE OF NEW JERSEY  
ADVERTISEMENT FOR BIDS  
BID #AB200033**

Under the provisions of the State College Contracts Law, Chapter 64 of Title 18-A, The College of New Jersey will receive sealed bids for the **Campus Fire Alarm Project** until **2:00 P.M. on the 7th day of July, 2020** at The College's Office of Finance and Business Services, Administrative Services Building, Second Floor, Room 201, Route 31 (Pennington Road), Ewing Township, New Jersey. At 2:00 P.M. all bids will be publicly opened and read in Room 203 of the Administrative Services Building.

The project will be bid as a Single Lump Sum.

No bidder may submit more than one bid.

Bid Documents may be obtained on/after **May 23, 2020** via our website ([www.tcnj.edu/~budfin/](http://www.tcnj.edu/~budfin/)).

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

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

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

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

# Fire Alarm Cable Hardware Software Upgrades Project

## Milestone Schedule

Date: 5/23/20

Advertise for bidding	May 23, 2020
Cut off for questions	June 19 , 2020
Addendum Issued (if needed)	June 25, 2020
Bids Received	July 7, 2020
Notice of Intent to Award issued	July 14, 2020
End of Protest Period	July 21, 2020
Notice to proceed issued by	July 23, 2020
Construction Start	July 27, 2020
Substantial Completion of fiber cable	September 17, 2021
Substantial Completion of hardware and software	December 30, 2022
Final completion	March 31, 2023

No Work on Campus Commencement 2021 May 20 & 21, 2021

No Work on Campus Special Olympics 2021 June 11-13, 2021

Dates for Commencement and Special Olympics 2022 are not set yet but figure no work to occur in late May and early June around the same time as 2021.

**Fire Alarm System Upgrades**

**Fiber Optic Cable, Hardware and Software**

**Project Priorities, Phasing, Strategy**

**And**

**Scope of Work Summary**

# Fire Alarm System Upgrades

## Project Priority, Phasing and Strategy

**Note:** The scope of work described in this document is not all inclusive. This document is intended to clarify project priorities, phasing, strategy etc. Refer to design documents including drawings and specifications for full scope details.

This project is divided into two parts: Part-A – Fiber Optic Cable Installations, and Part-B – Hardware and Software Upgrades. The Hardware and Software part is further sub divided into three phases: Phase 1, Phase 2 and Phase 3.

### 1. Existing Fire Alarm System:

The Campus currently has a Honeywell XBSi Front End located in the Power House with workstations in the Power House and Administrative Services buildings for remote monitoring. Most of the buildings on campus communicate to the Honeywell Front End using copper cabling infrastructure. Buildings equipped with non-Honeywell panels and some of the buildings with newer Honeywell panels communicate to the XBSi Front End through Honeywell FS90 panels functioning as intermediaries.

### 2. Objective:

The overall goal of this project is to upgrade and modernize the campus wide Fire alarm system. This will include:

- i) Replacement of the existing Honeywell XBSi Front End hardware and software with a new Life Safety Management System (LSMS).
- ii) Replacement of existing Simplex, Siemens, Honeywell and other Fire Alarm Control Panels (FACP) within all campus buildings, with new panels providing point-level, intelligent, and fully addressable (hereafter “fully addressable”) communication to the LSMS. Depending on the Contractor-Manufacturer that wins the bid, this will include replacement of all existing devices in some buildings to provide point-level addressability at the new LSMS.
- iii) Installation and utilization of fiber optic cables for inter-building system communications. Existing and newly installed fiber optic cables between the buildings will be utilized as the communications backbone to interconnect the new FACP’s to the LSMS. The installation of fiber optic cables is included in Part-A of this project.

### 3. Priority:

Following the bid award, the first priority will be to transition campus Fire alarm system monitoring off the existing Honeywell XBSi Front End as quickly as possible and to install fiber optic cable infrastructure.

The fiber optic cable installation sequence shall begin with the conduit installations in Power House, Green Hall, Cromwell Hall and ASB buildings to accommodate the interconnection of the new LSMS with the workstations. All associated conduit duct banks will also be prioritized to be installed first for the installation of fiber to these buildings.

The existing Front End and the new Life Safety Management System (LSMS) will operate in parallel, as individual building FACP's are transitioned to the new LSMS. Parallel operation of Front End and LSMS will be maintained until the last building on the old Front End has been transitioned to a new LSMS and the entire system (new LSMS and all connected FACP's) are confirmed working. At that time no buildings will report to the existing Honeywell XBSi Front End and it will be decommissioned.

- i) This is proposed to be executed by installing the new Life Safety Management System (LSMS) and new workstations in Power House and ASB immediately. This will include installation of network switches, workstations, servers and FACP's (as required) in Power House, Green Hall, Cromwell Hall and ASB buildings to accommodate the interconnection of the new LSMS with the workstations.
- ii) Following LSMS installation, install new FACP's compatible with the new LSMS in these four buildings. FACP installation sequence shall begin with the components and activities necessary to install and make operational the new LSMS.
- iii) At this time the new LSMS shall be commissioned for operation. These four FACP's shall not be connected to the existing building FACP's during the commissioning of the LSMS. The LSMS shall be made operational as a subsystem, prior to connecting FACP's for building monitoring.
- iv) After the new LSMS is commissioned and operational, connect all new panels from buildings to the new LSMS. At a minimum, the contractor will connect the Alarm, Supervisory and Trouble signals from the existing FACP to the new FACP in order to communicate building status to the new LSMS during the transition. Subsequently, transition all building devices to the new FACP in a phased approach to establish point-level intelligence and fully-addressable communications to the new LSMS.

The Hardware part of the project is subdivided into three Phases. The priority of buildings in each phase will depend on the Manufacturer of the new system. Some buildings have been prioritized to be included in phase-1 with full design. The Project documents provide building priority list. Bidders as per the bid document. After the bid award the Contractor will provide a list of buildings, they propose to include in each of the three Phases from the priority list. The College and its Engineer DLB in consultation with the Contractor will finalize the list based on availability of new fiber and building occupancy requirements.

The construction schedule and sequence of work will be dependent on several factors such as system manufacturer, fiber optic cable installation and occupancy of the buildings. This will be strategically evaluated with the Contractor during pre-construction once the Contractor-Manufacturer is on board.

#### **4. Fiber Optic Cable Installation Strategy**

The fiber optic cable installation sequence shall begin with the conduit installations in Power House, Green Hall, Cromwell Hall and ASB buildings to accommodate the interconnection of

the new LSMS with the workstations. This will include installation of all associated conduit duct banks for the installation of fiber to these buildings.

This will be followed by installation of new conduits and underground duct banks for Maintenance building and Forcina Hall followed by all other locations for fiber cable routing between buildings as shown on the drawings. This will require a minimum of 2-4" PVC conduits run in concrete duct banks between manholes and buildings.

The installation of new pathways inside buildings including conduits in electrical/mechanical rooms and other exposed areas as identified on drawings for connecting the new fiber to FACP's. This will also include installation of WCH's (Wall-mounted Connector Housing) near FACP's in each building as indicated on the drawings.

As pathway installations between buildings are completed, contractor shall install new Fiber communication cabling between buildings as shown on drawings. Fiber shall be routed continuous (un-spliced) from MDF room in one building to MDF room in another building. This includes routing fiber in underground duct banks and from point of entry (POE) in the building to MDF room. These pathways may be a combination of new conduits and existing conduits. Fiber will also be installed from MDF room to WCH which is to be located in the vicinity of the Fire Alarm control panel in each building. Fibers shall be terminated at all locations.

In some cases, the contractor shall Pull out existing communication fiber cable between buildings, where indicated, and install new larger fiber cables that would include fibers for both new fire alarm communication and the replacement fibers for existing IT requirements. Terminate all fibers. Disconnection of jumpers on existing fibers will be by TCNJ IT Department.

## 5. FACP Replacement Strategy

The Contractor will install new FACP's to establish point-level intelligence and fully addressable systems in all 47 campus facilities (44 Panels). In buildings with existing, capable devices from the same Manufacturer as the new LSMS, the new FACP's will act as main FACP's to communicate with the LSMS. In buildings with existing systems from a different Manufacturer, the new FACP's will temporarily act as intermediary panels for LSMS communication.

The building FACP's from different Manufacturers than the new LSMS, or otherwise unsuitable, will be removed during the phased device replacements in the buildings.

In buildings where existing Fire Alarm Control Panels are less than **11 years old**, are point-level intelligent and fully addressable, and are fully compatible with the new LSMS, are not required to be replaced. In these cases, Contractor shall submit supporting documentation including FACP manufacturer's certification of useful life, 10 years of continued support, and spare capacity meeting project requirements, prior to work being performed on site.

The proposed sequence of panel replacements and phasing of the fiber work sequence are with respect to project progress addressing College needs. The College will entertain a contractor's alternate sequencing of panel replacement following bid award, if efficiencies

can be demonstrated with respect to the College's requirements for project progression. The installation of FACP's will depend on the availability of fiber. Therefore, the sequence of construction for fiber infrastructure will be consistent with the intent to enable the LSMS and the Front-End workstations to function first and then proceed with per-building panel replacement as fiber becomes available. The sequence of construction will be generated by the contractor for discussion / review by the College.

There are other systems in various buildings connected to FACP's that communicate to the Front End through the fire alarm system. It will be the contractor's responsibility to transfer all those systems to new panels from the existing FACP's **with no cost to College**. These systems include security, fire shutters, clean/special agent systems, CO detectors and monitor modules for other miscellaneous systems. Contractor shall survey the buildings prior to preparing design drawings and include all additional circuits in the shop drawings.

The existing fire alarm system in the buildings shall remain operational and unimpaired until the replacement system is installed and fully functional and communicating with the LSMS. Impairments of the existing system shall be minimized and coordinated with the College as per the Project documentation. Fire watch will be required during all impairments. **All switchovers will be scheduled during off hours.**

As disconnection of existing FACP's progresses, Contractor shall ensure continued Front-End reporting and communication during the disconnection of existing FACP's across the campus and between upstream and downstream buildings. No disconnection work shall render the system nor adjacent buildings impaired with respect to system reporting.

## 6. Device Replacement Strategy

Depending on the Contractor-Manufacturer that wins the bid, some buildings will require full replacement of all existing devices to provide point-level addressability at the new Front End (LSMS). For these buildings, the Contractor will be responsible for providing signed and sealed shop drawings for the device replacements that comply with the recommendations and requirements in the Documentation section of the Fundamentals chapter in NFPA 72.

In buildings where existing devices must be replaced, the existing components shall be removed in their entirety from all areas of the existing facility. Contractor shall not leave any components of the existing system abandoned in place. Where wiring is required to be replaced, existing wiring shall be demolished in its entirety and removed from Campus. No existing wiring shall be abandoned in place.

In these buildings Contractor may reuse existing wiring, if the Contractor determines that the existing wiring is compatible with new devices, is less than **25 years old** and will provide point level addressability at the Front-End. All existing wiring that is over 25 years old in these buildings shall be replaced and not reused. It will be the contractor's responsibility to verify the existing wiring and determine if it can be used. Documentation and evidence of this case shall be furnished to The College for review and acceptance.

Contractor will be responsible for providing fully code compliant design and shop drawings for all buildings as per the requirements of NFPA 72. Existing device layouts for buildings are



provided as reference for contractor to utilize for full system replacements in the buildings, where required. Contractor shall survey the buildings prior to preparing design drawings and include all other devices and circuits, that are connected to Fire alarm system, in the shop drawings.

Contractor shall be required to work off hours to install new devices when buildings are active during the day to minimize impact on the building occupants. Therefore, the bidders should assume that the **construction in most buildings will be done during 2<sup>nd</sup> shift (4pm to 12 pm) and/or 3<sup>rd</sup> shift (12am to 8am)**. The residence Halls can only be accessed during summer or winter breaks; therefore, the construction in those buildings will be scheduled accordingly.

## 7. Phasing

Sequence of construction of the buildings for each Phase of the project will depend on the Manufacturer selected, the availability of fiber, occupancy in buildings, and the age of the FACP in the buildings.

### 5.1. Phase-1 Details

#### a. New Life Safety Management System Installation (LSMS)

- i) Install a new Life Safety Management System (LSMS) intended to replace the existing Honeywell XBSi Front End. The new system shall include all functionality currently implemented in the existing Honeywell XBSi system such as Graphic plans for each building; device status; alarm status; alarm control, trend logs; etc.
- ii) Install fully-featured remote control workstations in the Power House and the Administrative Services building. The workstation package shall include tower workstation, 24" monitor, keyboard, mouse, video display and all associated accessories.
- iii) Install new LSMS server packages in a redundant configuration between two locations: One in Green Hall and the other in Cromwell Hall buildings. Package shall include fully-configured rack-mount server, keyboard, mouse, video display and all associated accessories. 24" monitors as View screens shall also be provided in these two buildings in addition to the workstations in Power House and Administrative Services buildings.
- iv) The fire alarm systems that do not use separate LSMS servers and instead have the LSMS built into the Fire Alarm system with basic access from all panels, shall also install fully-featured remote control workstations co-located with the new FACP in the Green Hall and Cromwell Hall buildings. However, even in this case the Contractor shall furnish fully-featured workstations at each of the Power House and Administrative Services building locations.
- v) The communications network between the two remote control workstations and the two servers shall be fully interconnected in order to survive the failure/loss of any one of those four components and still maintain communications with the campus system and the remaining server(s)/workstation(s).

- vi) Disconnect and decommission the old Front End. The scheduling of this will depend on the winning bidder and manufacturer.

**b. Initial FACP Installations – All buildings\* (40 buildings and 4 auxiliary facilities)**

- i. Install new FACP’s in all buildings and auxiliary facilities to establish existing building system communication to the new LSMS. Installation shall include all associated accessories required to establish communications from the existing FACP with the new LSMS. The executed replacement procedure and sequence will depend on the Manufacturer selected, the existing system arrangement present in each building, and the availability of fiber.
- ii. The progress of Fiber infrastructure installation will be critical in determining the sequence/scheduling of new FACP panel installations.
- iii. Not all buildings are expected to be fully addressable to the LSMS following initial FACP installation during phase-1.

**c. Specific Priority Retrofits**

Fully retrofit the following buildings and auxiliary facilities with new FACP’s and devices as required:

**i. Buildings:**

- Forcina Hall
- Maintenance Building

**ii. Auxiliary Facilities:**

- Fire Pump House facility
- Stadium Concession facility
- Stadium Press Box and Generator building
- Soccer Press Box/Concession/Softball Press Box facilities

- iii. The existing fire alarm system shall remain operable until the replacement system is installed and fully functional.

**d. Transition 20 additional buildings from priority list**

Contractor in consultation with the Owner shall select an additional 20 buildings from the Priority list to transition to “fully addressable” installations. This will require full retrofit for some buildings, depending on the Manufacturers involved.

- i. The Contractor can include any buildings denoted with “X” on the Priority list in the first 20 buildings to be made fully addressable. However, if the devices in any building selected are not fully addressable or are made by a different Manufacturer, then it will be the Contractor’s responsibility to replace all devices in that building as per the latest codes and standards.

- ii. For replacement of building devices, the Contractor shall furnish a code-compliant design with complete design documents and shop drawings for the building. Submit these for review and approval by the College and the College's Engineer DLB. The design documents/shop drawings, once approved by the Engineer, will be submitted to DCA for review and approval.
- iii. The Contractor will be responsible for providing shop drawings that comply with the recommendations and requirements in the Documentation section of the Fundamentals chapter in NFPA 72. Existing device layouts for buildings are provided as reference for the Contractor to utilize for full system replacements in those buildings as a Delegated Design.
- iv. New wiring will be required to connect any additional devices installed to bring the building to latest code.
- v. Contractor will include the following for buildings where existing devices will require replacement.
  1. Installation of all new devices, wiring and pathways and connection of new devices to new FACP.
  2. Programming and integration of all new devices into the new fire alarm system LSMS.
  3. Providing LSMS graphics by floor and by device.
  4. Providing all required shop drawings for review by TCNJ Engineer and for submittal to DCA by building. Permit fees will be paid by TCNJ.
  5. Demolishing all existing devices and wiring and remove from campus.

### **5.2. Phase-2 Details**

After completion of Phase-1, Contractor in consultation with the owner will select the next 10 buildings from the Project priority list to transition to "fully addressable" installations during Phase-2. This will require full retrofit for some buildings, depending on the Manufacturers involved. The process and strategy for device replacements will be the same as in Phase-1.

### **5.3. Phase-3 Details**

After completion of Phase-2, Contractor shall transition the remaining buildings from the Project list to "fully addressable" installations during Phase-3. This may require full retrofit for some buildings, depending on the Manufacturers involved. The process and strategy for device replacements will be the same as in Phases 1 and 2.

## **8. Integration with new LSMS**

All new FACP's will be integrated into the new campus Life Safety Management System as per the specifications with provisions made accordingly so that Phase 2 and 3 upgrades can be implemented smoothly once those buildings are complete.

For initial installation of new FACP's in all buildings where new FACP will be intermediary to existing building system during the interim period, Integration with the new Front End shall minimally include:

Campus Map with building alarm status (OK, Supervisory, Trouble, Alarm) shown as building outline filled with corresponding color (Green, Yellow, Orange, Red).

Current and historical state of building system overall condition (OK, Trouble, Supervisory, Alarm)

As buildings are fully retrofitted and transitioned to the new LSMS, Integration shall be made complete for those buildings as per the specifications. Schedule for Integration shall be concurrent with device installation on a per-building basis.

## 9. LSMS Workstation Graphics requirements

The graphic user interface shall be as per the specifications. Contractor shall coordinate with the owner during the development of the interface graphics. As a minimum the graphics will include a home screen starting with a campus level map with alert bar and allow for users to drill down through building and floor, to the individual addressable device level information inside each building. This shall also include all functionality currently implemented on the existing system, such as graphic plans for each building, device status, alarm status, alarm control, trend logs, etc.

College will furnish AutoCAD floorplans for all buildings for use in developing LSMS displays per-building and per-floor.

## 10. Carbon Monoxide (CO) Detection:

Contractor shall install carbon monoxide detectors as per the design documents in buildings identified. All new CO detectors will be connected to the new fire alarm panels and integrated into the new LSMS.

## 11. Testing Requirements:

Acceptance testing of all panels and devices shall be conducted to verify proper operation of the system and the devices once panel replacements are completed. Contractor shall perform the testing as per the specifications, code requirements and comply with NFPA 72 under test methods for system testing.

## 12. Removing Existing Copper Cables:

Contractor shall demolish all existing XBSi loop copper cables within buildings after connecting new FACP's to fiber optic cables. This will involve the following:

- i) Contractor shall demolish existing inter-building copper cabling back to the point of entry (POE). Maintain and coil 6-feet of existing cabling at the point of entry conduit.
- ii) Using self-laminated tags, identify this cable as FIRE ALARM CABLE – ABANDONED OUT OF SERVICE – BUILDING TO <Name>. Identification text shall be coordinated with TCNJ/IT.
- iii) Identify this cable in the adjacent manhole, and apply the same self-laminated tag and label where this cable enters and leaves the manhole.

**13. DCA Coordination:**

DLB, the College's Engineer, has submitted preliminary project design documents (Drawings and Specifications) to DCA for review. However, DCA will release the project permits only after they complete their review of the associated shop drawings. Therefore, the Contractor will:

- i) Submit design documents and shop drawings to College's Engineer DLB for review and submittal to DCA.
  - a. Shop drawings will include device cut sheets, voltage and battery calculations, etc. per NFPA and IBC submittal requirements.
  - b. DLB will submit the documents to DCA for each building separately as required by DCA.
- ii) TCNJ will pay for the permit fees.

**14. Schedule**

The project is expected to take approximately 2 years to implement; however, it will depend on the Contractor-Manufacturer selected. The construction schedule and sequence of work will be dependent on several factors such as system manufacturer, fiber cable installation and occupancy of the buildings. This will be strategically evaluated with Campus Construction during pre-construction once the Contractor-Manufacturer is on board.

In general, the **contractor may have to work 2<sup>nd</sup> or 3<sup>rd</sup> shifts** while the buildings are in use during the day to accommodate the schedule and construction. The goal is to minimize shutdowns and impact on the buildings. Therefore, the bidders should assume that the construction in some buildings will be done off-hours. The residence Halls can only be accessed during summer or winter breaks; therefore, the construction in those buildings will be scheduled accordingly.

**15. Annual Maintenance Contract:**

- i) Provide costs for 5-year-term annual maintenance contract for all buildings after the substantial completion of the project. The term maintenance contract will start after the substantial completion of the whole project and will be renewed annually after that.
- ii) The Maintenance contract will, as a minimum, require that all fire alarm systems be inspected, tested, serviced and maintained in accordance with **NFPA 72 and the National Fire Alarm Code**.
- iii) The maintenance and operation of the new campus fire alarm system across all buildings will be the responsibility of the Contractor during the construction of the project, even though some buildings may have fully completed construction.

**THE COLLEGE OF NEW JERSEY  
Construction Bid Proposal Form**

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

**Bid Number: AB200033  
Bid Due Date: July 7, 2020**

**Project Name: Campus Fire Alarm**

**BIDDER INFORMATION**

Firm Name:

Telephone Number:

Contact Person:

Fax Number:

Address:

Email Address:

Federal I.D. Number:

**SOLICITATION OF CONSTRUCTION BIDS**

- 1. Bid proposals are solicited as follows:**
  - A. Single Bid (Lump Sum) which combines all trades.**
    - (1) The total number and types of trades are set forth in the Specifications.**
    - (2) Bidder enters the Bid Price on the line provided.**
    - (3) Pursuant to the requirements of N.J.S.A. 18A:64-76.1., bidder lists the names of the subcontractors on the Subcontractor Information page.**
- 2. The scope of work includes (See Scope of Work Summary after cover page of the bid).**
  - A. See Specifications and Drawings for Details (included in RFP package).**
  - B. The College may issue Addenda or Clarifications which may include additions to or deletions from the scope of work; changes to the Specifications, Drawings, and proposal form; and clarifications of requirements. Bidder is advised to review all Addenda and/or clarifications carefully, and shall note the receipt of same with their bid package.**

## GENERAL INSTRUCTIONS AND REQUIREMENTS

### 1. PRICES

- A. Bidder submits prices for the Base Bid and any Alternate Proposals and Unit Prices which are listed for the contract of the bid. If there is no cost associated with the Alternate or Unit Price, bidder is required to enter “0.00” or “no change”.
- B. Prevailing wage rates apply (Mercer County).
- C. Bid is to remain good for sixty (60) days after the Bid Due Date.

### 2. BOND REQUIREMENTS AND SURETY STANDARDS

- A. Bidder must submit with its bid a Certified Check in the amount of ten percent (10%) of the total bid, or a Bid Bond in the amount of ten percent (10%) of the total bid.
- B. The successful bidder must submit a Performance and Payment Bond equal to 100% of the contract. A completed Surety Disclosure Statement and Certification must accompany the Performance and Payment Bond.
  - (1) The Performance and Payment Bond form and a sample Surety Disclosure Statement and Certification form are included at the end of this Construction Bid Proposal Form.
- C. All bid deposits shall be returned within three (3) days, Sunday and holidays excepted, after the awarding of the contract and the approval of the successful bidder’s performance bond, if any, the bid guaranty of the remaining bidders shall be returned to them.
- D. Should the successful bidder fail to enter into said contract after acceptance of bid by the College, then the check or security deposited by that bidder shall, at the option of the College, be retained as liquidated damages, or if Bid Bond has been supplied, principal and surety shall be liable to the amount of the Bid Bond.
- E. Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified copy of their Power of Attorney to sign said bonds.

### 3. LICENSES, CERTIFICATIONS, REGISTRATIONS, QUALIFICATIONS

- A. The bidder or, as applicable, its subcontractors shall at the time of bid have those required licenses, certifications, registrations, qualifications and the like (“LCRQ”) listed below and shall present satisfactory evidence thereof upon request of the College prior to the notice of intent to award.
- B. The selected bidder/contractor or, as applicable, its subcontractors shall have and shall present satisfactory evidence of all other required LCRQ noted in the Specifications after execution of contract during the submittal process and prior to the start of the applicable work, unless otherwise requested by the College or a date or event specified for that LCRQ in the Specifications.

### 4. SUBCONTRACTORS

- A. Pursuant to New Jersey State Law (N.J.S.A. 18A-76.1), a Single Bid (Lump Sum) bidder discloses its subcontractors to whom the bidder intends to subcontract the work. The Subcontractor Information sheet is provided for this purpose.
5. Under Executive Order 34, the College is responsible for soliciting demographic information from its vendors. The College is required to seek the following information from each firm under contract with the College:
1. Is more than fifty percent (50%) of your company minority owned? (circle one) YES NO  
(African-American, Hispanic, Asian, and/or Native American)
  2. Is more than fifty percent (50%) of your company woman owned? (circle one) YES NO
  3. What is the ethnicity of the owner of your company: (check applicable according to 51% ownership)
    - Asian American
    - Multiple Ethnicities
    - Non-Minority
    - Hispanic American
    - African American
    - Caucasian American Female
    - Native American
    - Unspecified

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

**EXECUTIVE ORDER #34: MINORITY AND WOMEN BUSINESS ENTERPRISES**

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

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

6. Bidder completes Statement of Ownership Disclosure form and the Non-Collusion Affidavit form.
7. ~~Bidders are required to be registered with the New Jersey Department of Property Management and Construction (DPMC) and possess a DPMC C008 classification at the time of bid submission.~~



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

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

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

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

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

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

## 10. NEW JERSEY EQUAL PAY ACT

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

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

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

11. In order for your proposal to be accepted and deemed valid, your company/firm will be required to comply with the requirements of N.J.S.A. 19:44A-1 et seq/P.L. 2005 Ch. 51 ("Chapter 51") and Executive Order 117. Enclosed are the requirements of Chapter 51 and Executive Order 117, the forms for Certification and Disclosure. The contract that will be generated based on this bid proposal cannot be awarded without approval of the Certification and Disclosure forms by the State of New Jersey, Department of Treasury. **A completed copy of your Certification form is not required at time of bid; however, it will be required from the bidder who receives the notice of intent to award from the College prior to the execution of the contract.**
12. Pursuant to N.J.S.A. 52:32-44, The College of New Jersey ("Contracting Agency") is prohibited from entering into a contract with an entity unless the bidder/proposer/contractor, and each subcontractor that is required by law to be named in

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

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

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

During the course of contract performance:

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

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

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

- 13. Record Retention:** Pursuant to N.J.A.C. 17:44-2.2, the vendor shall maintain all documentation related to products, transactions or services under this contract for a period of five years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.
- 14. Energy Star energy efficient products:** Under Executive Order #11 (Corzine), the College is required to select ENERGY STAR energy-efficient products when acquiring new energy-using products or replacing existing equipment. For products

that do not have ENERGY STAR labels, vendors shall follow guidelines established by the New Jersey Clean Energy Program.

## 15. QUESTIONS

- A. Direct inquiries and correspondence relating to this proposal form and questions regarding the technical specifications and requests for clarification must be submitted in writing via **email to horodesk@tcnj.edu** and must be received **prior to 4:00 p.m., on June 19, 2020.**
- B. Should any questions be received, a notice will be placed in the newspaper and the addendum or clarification will be available on **June 25, 2020 on the College's website at <https://bids.tcnj.edu/>.** **If an addendum and/or clarification is posted, it SHOULD be noted in the General Agreement section of the bidder's proposal. Failure to do so may subject Bidder to disqualification.**

## 16. HOW TO SUBMIT THE COMPLETED CONSTRUCTION BID PROPOSAL FORM

- A. Bidder places all pages of the completed form and the requisite additional documents in an envelope, seals the envelope, and labels it with his/her firm name, address, and "Sealed Bid Enclosed for (**Bid Number and Project Name**)".
  - B. Bidder mails or deliver by hand the sealed bid, no later than **2:00 p.m., July 7, 2020**, to The College of New Jersey, Attention: Roselle Horodeski for (specify the Bid Number), Office of Finance & Business Services, Room 201, 2000 Pennington Road, Ewing, New Jersey 08628-0718. **At 2:00 p.m., all bids will be publicly opened and read in Room 203 of the Administrative Services Building.**
  - C. Contractors are advised that the U.S. Postal Service and all express mail companies deliver to The College's Mail Room or Receiving Department, not directly to the Office of Budget & Finance. The College is not responsible for lost or misdirected bids.
17. Any bid not prepared and submitted in accordance with the provisions described herein may be rejected by the College. Any bid received after the time and date specified will not be considered. No bidder shall withdraw a bid within sixty (60) days after the date of the bid opening. Contracts shall be awarded to the lowest responsible bidder whose bid, conforming to the invitation for bids, will be the most advantageous to the State college
18. Any bidder who has defaulted on any contract with the College or any other State Agency may be considered as not responsible and their bid may be rejected. THE COLLEGE OF NEW JERSEY reserves the right to exercise this option, as the College deems proper and/or necessary in accordance with applicable law.

19. Bids shall include all costs of any nature necessary to complete the project in the manner and within the time required by the contract.
20. The College reserves the right to require bidders to provide a schedule of values of their lump sum bid price upon request.
21. The College is exempt from all taxes including Federal Excise Tax, Transportation Taxes, State Excise, Sales Tax and local taxes. Rentals of equipment for 28 days or less is not exempt from any tax under the State sales tax act.
22. Before submitting his bid, the bidder shall be familiar with the Drawings, Specifications, and other Documents that will form part of the contract and shall have visited the site of the project to confirm for themselves the character and amount of work involved.
23. No bidder shall be allowed to offer more than one price on each item even though he/she may feel that he/she has two or more types or styles that will meet specifications. Bidders must determine for themselves which to offer. This may be cause for automatic rejection of bid.
24. It is understood and agreed that all prices quoted are firm and not subject to any increase during the life of the contract.
25. Should any difference arise between the contracting parties as to the meaning or intent of these instructions or specifications, the College's decision shall be final and conclusive.
26. Should the bidder discover discrepancies in this Request for Bids, the matter shall be at once brought to the attention of the College, and the discrepancies corrected by written agreement before submission of bid. The correction will be issued by addendum.

**27. ACCEPTANCE/REJECTION OF BIDS**

- A. THE COLLEGE OF NEW JERSEY, pursuant to State College Contract Law, Contracts shall be awarded to the lowest responsible bidder whose bid, conforming to the invitation for bids, will be the most advantageous to the State college.
- B. The bid is irrevocable by the bidder or the bidder's representatives. The bid, and any award made to the bidder by the College, shall bind the bidder and the bidder's heirs, executors, administrators, successors or assigns.
- C. Award of contract shall be made to the lowest responsible bidder, whose bid, conforming to the invitation for bids, is the most advantageous to the College.
- D. The award of the contract or the rejection of the bids shall be made within sixty (60) days of the date of receiving bids, unless written extensions are requested by the College and accepted by the bidder(s). All bid securities shall be returned immediately if all bids are rejected. The successful bidder(s) to whom the award

is to be made will be notified by receipt of a written "Intent to Award" from the College.

- E. When award of contract is made in one fiscal year with effective date in the next fiscal year, award shall be contingent upon the availability and appropriation of sufficient funds for that purpose for the year in which said contract takes effect. When a contract shall be awarded for a period in excess of one year, said contract shall be contingent upon the annual availability and appropriation of sufficient funds for that purpose for each year of the contract term.

## **28. WITHDRAWAL OF BIDS**

- A. A written request for the withdrawal of a bid, or any part thereof, will be granted if the request is received by the College prior to the specified time of the bid opening.
- B. Should the bidder refuse to perform the work for the price provided, they will forfeit their bid security and will be held liable for the difference between their low bid and the next highest/responsive bidder.

## **29. OSHA COMPLIANCE:**

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

## **30. APPLICABLE LAWS:**

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

- (1) New Jersey Statutes and Regulations

- N.J.S.A. 10:5-31 *et seq.* and N.J.A.C. 17:27-1 *et seq.*, Affirmative Action

- Prevailing Wage Act, N.J.S.A. 34:11-56.25 *et seq.*

- N.J.S.A. 52:32-44, Business Registration Certificate

- N.J.S.A. 34:11-56.48 *et seq.*, Public Works Contractor Registration Act

- (2) Federal Statutes

- Immigration Control and Reform Act (1986) – 8 U.S.C.A. Section 1324(a) *et seq.*

- Civil Rights Act of 1964 – 42 U.S.C.A. Section 1971 *et seq.*

- The Americans with Disabilities Act of 1990

## **31. EXAMINATION OF SITE, DRAWINGS AND SPECIFICATIONS**

- A. Each Bidder shall visit the site of the proposed work and fully acquaint themselves with the conditions as they exist so that they may fully understand the

facilities, difficulties, and restrictions attending the execution of the work under this Contract.

- B. Bidders shall also thoroughly examine and be familiar with the Drawings and Specifications. The failure to receive or examine any form, instrument or document, or to visit the site and acquaint himself with conditions there existing shall in no way relieve any bidder from obligation with respect to his bid. By submitting a bid, the bidder agrees and warrants that he has examined the site, the Drawings and Specifications and, that the Specifications and Drawings are adequate and the required result can be produced under the Drawings and Specifications. No claim for any extra will be allowed because of alleged impossibilities in the productions of the results specified or because of unintentional errors or conflicts in the Drawings and Specifications. No change orders will be issued for items, materials or issues that existed on or with respect to the site prior to bidding.

### **32. DRAWINGS AND SPECIFICATIONS**

- A. The project shall be performed in accordance with the requirements of the Drawings and Specifications, subject to modification as provided in General Conditions. The Drawings and Specifications are intended to complement and supplement each other.
- B. Any work required by either of them and not by the other shall be performed as if denoted in both. Should any work be required which is not also denoted in the Specifications or on the Drawings because of an obvious omission, but which is, nevertheless, necessary for the proper performance of the project, such work shall be performed as fully as if it were described and delineated.

### **33. FORM OF AGREEMENT**

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

### **34. MULTIPLE BIDS NOT ALLOWED:**

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

### **35. SUBSTITUTIONS:**

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

determine if the proposed substitute is equal to the contract requirements, and any substitution must be approved by the architect and the College.

- B.** The College shall have complete discretion to decide whether it will accept any substitution. No substitution shall result in any increase in the contract price or times. The successful bidder in its application for the substitution must certify in writing that the substitution is equal to what is specified in the contract documents in all material respects and will not increase the time or price of the contract work.
- C.** Should the substitution be rejected, the contractor will then be required to provide the specified product, material or method at no additional cost to the College and no change in the project schedule.

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

- **AFFIRMATIVE ACTION:** The bidder is required to complete and submit a copy of Initial Project Workforce Report (AA-201) to the College and the Division of Public Contracts Equal Employment Opportunity Compliance verifying that the bidder is operating under a federally approved or sanctioned Affirmative Action program. The bidder also agrees to submit a copy of the Monthly Project Workforce Report once a month thereafter for the duration of this contract to The College and the Division.
- **CERTIFICATE OF INSURANCE:** The bidder is required to submit proof of liability insurance in accordance with The College's contract.
- **PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATES**
- **P.L. 2005, Chapter 51 / Executive Order 117 - Contractor Certification and Disclosure of Political Contributions:**

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

- **New Jersey Business Registration Certificate**
- **All applicable licenses, certificates, and requirements specified in the scope of work, contract documents and specifications.**



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

- a. \_\_\_\_\_ Bidder has completed the Bidder Information section and General Agreement section and filled out the receipt of addendum and clarifications.
- b. \_\_\_\_\_ Bidder has completed the form of proposal and indicated base bid for either Separate Bid or Single Bid (Lump Sum all trades), prices for Alternate Proposals, and Unit Prices.
- c. \_\_\_\_\_ Bidder for Single Bid (Lump Sum) has listed and has disclosed the subcontractors on the Subcontractor Information form.
- d. \_\_\_\_\_ Bidder has enclosed a certified check or bid bond for ten percent (10%) of the amount of the bid.
- e. \_\_\_\_\_ Bidder has completed and enclosed the Non-Collusion Affidavit.
- f. \_\_\_\_\_ Bidder and each disclosed subcontractor has enclosed a copy of its **registration certificate** in accordance with the requirement of the Public Works Contractor Registration Act. (NJ Dept. of Labor and Workforce Development). **A completed copy of your Certification form is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**
- g. \_\_\_\_\_ Bidder has acknowledged the **Affirmative Action Language** in accordance with the requirements P.L. 1975 C.127. (NJAC 17:27-1.1 et seq).
- h. \_\_\_\_\_ Bidder has enclosed its MWBE information.
- i. \_\_\_\_\_ Bidder has enclosed its Electrical and Plumbing License and any other licenses, certifications, certifications, and qualifications.
- j. \_\_\_\_\_ Bidder has enclosed its Vendor Qualification Statement
- ~~k. \_\_\_\_\_ Bidder has included a copy of its latest Experience Modification Rating (EMR Safety Rating). The College requires an average rating over the last 5 years of 1.25 or less.~~
- ~~l. \_\_\_\_\_ Bidder has included a copy of its DPMC Notice of Classification and Total Amount of Uncompleted Contracts.~~
- m. \_\_\_\_\_ Bidder has enclosed a copy of its Chapter 51 & EO117 Certification form. **A completed copy of your Certification form is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**
- n. \_\_\_\_\_ Bidder has enclosed a copy of its New Jersey Business Registration Certificate in accordance with the requirements of the New Jersey Division of Revenue. **A completed copy of your Certificate is not required at time of bid; however, will be required from the bidder who receives the intent to award from the College.**

- o. \_\_\_\_\_ Statement of Ownership Disclosure(N.J.S.A. 52:25-24.2).**
- p. \_\_\_\_\_ Disclosure of Investment Activities in Iran (N.J.S.A. 52:32-58).**

**GENERAL AGREEMENT**

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

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

Addendum Number \_\_\_\_\_ Date \_\_\_\_\_ Addendum Number \_\_\_\_\_ Date \_\_\_\_\_  
Addendum Number \_\_\_\_\_ Date \_\_\_\_\_ Addendum Number \_\_\_\_\_ Date \_\_\_\_\_  
Addendum Number \_\_\_\_\_ Date \_\_\_\_\_ Addendum Number \_\_\_\_\_ Date \_\_\_\_\_

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

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

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

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

(Seal if bid is by Corporation)

Respectfully submitted,

\_\_\_\_\_  
(Signature of Principal)

\_\_\_\_\_  
(Printed Name of Principal)

\_\_\_\_\_  
(Title of Principal)

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

To: **The College of New Jersey**

for: Campus Fire Alarm

Date \_\_\_\_\_

**A. BID: See Bid Summary Notes on Page 20**

SECTION - A:

- 1. PART-A (CABLE INFRASTRUCTURE): \$ \_\_\_\_\_
- 2. PART-B (HARDWARE AND SOFTWARE): \$ \_\_\_\_\_
- 3. ENVIRONMENTAL ALLOWANCE: **\$ 50,000.00**

SECTION - B

- 4. 5-YEAR MAINTENANCE CONTRACT: \$ \_\_\_\_\_

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

**Total of Section A and B (including environmental allowance)**

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
 (words)

**General Construction (Single overall Prime Contract)**

**2. Add Alternates**

**Alternate #1** – Fiber cable strand count change. Cable strand counts reflected in the drawing set indicate base bid size and alternate is reflected in table on G004A. Alternate shall include changed cable size and all additional connector housings, cassettes, connectors, terminations, testing, etc.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
 (words)

**Alternate #2** – Underground duct bank conduit quantity change. Refer to table on drawings FA005, FA006, FA007 and FA008 for duct banks included in this change.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

**Alternate #3** – New underground 4” conduit routed to provide link between Travers to the TW Garage. Existing underground conduit will be scoped as part of the base bid to determine if conduit has been compromised.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

**Alternate #4** – New underground 4” conduit will be routed to provide link between the Power House and the Maintenance building. Routing will follow the existing path from the chiller room to the pull box on the exterior of maintenance. The existing underground conduit will be scoped as part of the base bid to determine if conduit has been compromised.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

**Alternate #5:** This alternate will install OS2/OM4 type fiber as an upgrade in lieu of type OS2/OM3. This includes the outside plant and riser cables and all necessary termination cassettes, connectors, terminations and testing. Fiber type upgrade is considered separately for Base Bid Scope and Add-Alternate-1 scope.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

**Alternate #5-1:** Provide cost increase for upgrading all OS2/OM3 fiber proposed for installation under Base Bid scope (shown on drawing G004) to type OS2/OM4:

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

**Alternate #5-2:** Provide cost increase for upgrading all OS2/OM3 fiber proposed for installation with Add-Alternate-1 (shown on drawings G004 and G004A) to type OS2/OM4. Refer to Add-Alternate #5-2 worksheet (See Attachment-1) that lists combined cables from these two drawings that are included in Add-Alternate #5-2.

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(words)

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

3. CHECK LIST FOR BIDDERS:

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

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

**PART-A UNIT PRICES (CABLE INFRASTRUCTURE):**

1. Per foot – (2) 4” conduit duct bank (include trenching, conduit, concrete encasement, backfill, surface restoration, tracer wire) \$ \_\_\_\_\_

2. Per foot – (4) 4” conduit duct bank (include trenching, conduit, concrete encasement, backfill, surface restoration, tracer wire) \$ \_\_\_\_\_

3. 100 linear foot – 12/12 indoor/outdoor fiber installed in existing pathway terminated on both ends. \$ \_\_\_\_\_

4. 100 Linear foot – 24/24 fiber installed in existing pathway terminated on both ends \$ \_\_\_\_\_

5. 100 Linear foot – 36/36 fiber installed in existing pathway terminated on both ends \$ \_\_\_\_\_

6. 100 Linear foot – 48/48 fiber installed in existing pathway terminated on both ends \$ \_\_\_\_\_

7. 100 Linear foot – 96/96 fiber installed in existing pathway terminated on both ends \$ \_\_\_\_\_

8. 100 Linear foot – 144/144 fiber installed in existing pathway terminated on both ends \$ \_\_\_\_\_

9. 100 Linear foot – 12/12 indoor fiber installed in 1-1/4” EMT with terminations on both ends \$ \_\_\_\_\_

10. Medium (6’x6’x8’) precast manhole provided and installed \$ \_\_\_\_\_

B.1. UNIT PRICES: We, the Undersigned, agree, if awarded the Contract to perform additional work or delete work at the Unit Prices set forth below or at a negotiated unit price (Unit Prices are for work that is in addition to or is deleted from the base bid work). Unit costs for each item below shall include the cost for furnishing, installing, mounting, cabling, etc. for a completely functional device including programming thru final acceptance.

**PART-B UNIT PRICES: (HARDWARE AND SOFTWARE):**

1. Smoke detector (photoelectric area smoke detector) \$ \_\_\_\_\_

2. Duct smoke detectors, interposing relays, and remote test station (LED indicator device) \$ \_\_\_\_\_

1. Heat detector (Combination rate of rise): \$ \_\_\_\_\_

2. Heat Detector (fixed temperature): \$ \_\_\_\_\_

3. Manual Pull station (including cover): \$ \_\_\_\_\_

4. Carbon Monoxide Detector: \$ \_\_\_\_\_

5. Notification appliance (combination audible and visual): \$ \_\_\_\_\_

6. Visual fire alarm appliance: \$ \_\_\_\_\_

7. Addressable control module: \$ \_\_\_\_\_

9. Addressable monitor module: \$ \_\_\_\_\_

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

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

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

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

Certified Check           \$ \_\_\_\_\_  
Bid Bond                   \$ \_\_\_\_\_

F. **STATEMENT:**

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

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

Addenda Number	Dated
_____	_____
_____	_____
_____	_____

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

Dated \_\_\_\_\_

Firm Name \_\_\_\_\_ Phone Number: \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_

\*\*If a corporation, give the State of Incorporation, using the phrase:

"A corporation organized under the laws of \_\_\_\_\_."

If a partnership, give names of the partners, using also the phrase:

"Co-partners trading and doing business under the firm name and style of \_\_\_\_\_"

If an individual using a trade name, give individual name, also using the phrase:

"An individual doing business under the firm name and style of \_\_\_\_\_"

Dated: \_\_\_\_\_

STATE OF \_\_\_\_\_

SS.

COUNTY OF \_\_\_\_\_

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

Sworn and subscribed before me

\_\_\_\_\_

Bidder signs above line

this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

\_\_\_\_\_

Print Name

and

\_\_\_\_\_

Title



**BID SUMMARY NOTES:**

1. Contractors will include in their bids an environmental allowance of \$50,000 to be used for asbestos remediation, if required. Selected contractor will review and survey the proposed conduit routings in each building for any environmental hazards. If any areas of asbestos are suspected and cannot be avoided, contractor shall engage an environmental consultant for testing and remediation. Contractor will bill any costs associated with the environmental remediation against the allowance amount. The cost will be accounted for via an allowance reduction form to manage the allowance.
2. The Maintenance contract will as a minimum require all fire alarm systems to be inspected, tested and maintained in accordance with **NFPA 72 and the National Fire Alarm Code**. Maintenance Contract will be renewed annually after the 5-year maintenance contract is completed.
3. Maintenance for buildings completed prior the substantial completion of the project shall remain the responsibility of the contractor until the final turn over of the whole project.

# Attachment #1 - Add-Alternate 5- 2

<b>SPAN ID</b>	<b>Starting Building</b>	<b>Ending Building</b>	<b>Cable</b>	<b>Type</b>
1	Armstrong Hall	STEM Building	12/12	OS2/OM4
2	Bliss Hall	Kendall Hall	48/48	OS2/OM4
3	Business Building	Kendall Hall	24/24	OS2/OM4
4	Trenton Hall	Kendall Hall	36/36	OS2/OM4
5	Music Building	Kendall Hall	24/24	OS2/OM4
6	Social Science	Kendall Hall	36/36	OS2/OM4
	Kendall Hall	Green Hall	144/144	OS2/OM4
8	Forcina Hall	Roscoe Hall	24/24	OS2/OM4
9	Centennial Hall	Roscoe Hall	24/24	OS2/OM4
10	Gitenstein Library	Roscoe Hall	36/36	OS2/OM4
11	Roscoe Hall	Green Hall	96/96	OS2/OM4
12	Spiritual Center	Ely-Allen-Brewster	12/12	OS2/OM4
13	Maintenance Building	Powerhouse	24/24	OS2/OM4
14	Powerhouse	Ely-Allen-Brewster	48/48	OS2/OM4
15	Decker Hall	Ely-Allen-Brewster	36/36	OS2/OM4
16	Ely-Allen-Brewster	Green Hall	144/144	OS2/OM4
17	New Residence Hall	Eickhoff Hall	24/24	OS2/OM4
18	Packer Hall	Eickhoff Hall	36/36	OS2/OM4
19	Eickhoff Hall	Green Hall	96/96	OS2/OM4
20	TH1 (Town House West)	Cromwell Hall	48/48	OS2/OM4
21	TH5 21A/B (Town House East)	Cromwell Hall	(2) 36/36	OS2/OM4
22	TH9 (Town House South)	Cromwell Hall	48/48	OS2/OM4
23	Travers Hall	Cromwell Hall	12/12	OS2/OM4
24	Decker Garage	Cromwell Hall	12/12	OS2/OM4
25	Recreation Center	Cromwell Hall	36/36	OS2/OM4
26	Stadium Generator Building	Recreation Center	12/12	OS2/OM4
27	Stadium Concession Stand	Recreation Center	12/12	OS2/OM4
32	Cromwell Hall	Green Hall	144/144	OS2/OM4
33	Travers/Wolfe Garage	Travers Hall	12/12	OS2/OM4
41	Eickhoff Room 227	Eickhoff Room 337	48/48	OS2/OM4

## **SUBCONTRACTOR INFORMATION FOR SINGLE BID (LUMP SUM)**

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

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

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

#### **Plumbing and Gas Fitting Work**

##### **List information for Subcontractor, if any:**

Name: \_\_\_\_\_  
License Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_

#### **Refrigeration, Heating and Ventilating Systems and Equipment**

##### **List information for Subcontractor, if any:**

Name: \_\_\_\_\_  
License Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_

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

**List information for Subcontractor, if any:**

Name: \_\_\_\_\_  
License Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_

**Structural Steel Work and Ornamental Iron Work**

**List information for Subcontractor, if any:**

Name: \_\_\_\_\_  
License Number: \_\_\_\_\_  
Address: \_\_\_\_\_  
\_\_\_\_\_  
Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_

\_\_\_\_\_  
Bidder Name

By: \_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name of Signing Individual

\_\_\_\_\_  
Date

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

1. Contractor and sub-contractors are requested to check all of the following that apply to their company and, if applicable, submit a copy of their certificate(s):
  - A. My company is certified by the NJ Department of Treasury, Division of Revenue as a:  
\_\_\_\_\_ small business \_\_\_\_\_ minority-owned business \_\_\_\_\_ female-owned business
  - B. My company is certified by the NJ Department of Transportation as a:  
\_\_\_\_\_ small business \_\_\_\_\_ minority-owned business \_\_\_\_\_ female-owned business
  - C. My company is a \_\_\_\_\_ small business \_\_\_\_\_ minority-owned or \_\_\_\_\_ female-owned but is not certified by either NJ Department.
  - C. \_\_\_\_\_ My company is not a small business, minority-owned or female-owned.

\_\_\_\_\_  
**Signed**

\_\_\_\_\_  
**Date**



**PERFORMANCE BOND & PAYMENT BOND**

BOND NO. \_\_\_\_\_

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

SIGNED this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

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

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

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

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

SIGNED, SEALED AND DELIVERED  
IN THE PRESENCE OF

\_\_\_\_\_  
Witness

BY: \_\_\_\_\_

\_\_\_\_\_  
Witness as to Surety

BY: \_\_\_\_\_  
ATTORNEY-IN-FACT

Countersigned

NOTE: General Power of Attorney and the current

this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_

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

BY: \_\_\_\_\_

**SURETY DISCLOSURE STATEMENT AND CERTIFICATION**

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

- (1) The surety meets the applicable capital and surplus requirements of R.S. 17:17-6 or R.S. 17:17-7 as of the surety's most current annual filing with the New Jersey Department of Insurance.
- (2) The capital (where applicable) and surplus, as determined in accordance with the applicable laws of the State of New Jersey, of the surety(ies) participating in the issuance of the attached bond is (are) in the following amount(s) as of the calendar year ending December 31, \_\_\_\_\_, (insert most recent calendar year for which capital and surplus amounts are available), which amounts have been certified as indicated by certified public accountants (indicating separately for each surety that surety's capital and surplus amounts, together with the name and address of the firm of certified public accountants that shall have certified those amounts):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

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

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

\_\_\_\_\_

\_\_\_\_\_

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

### **CERTIFICATION**

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

I, \_\_\_\_\_ (name of agent), as \_\_\_\_\_ (title of agent)

for \_\_\_\_\_ (name of surety),

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

\_\_\_\_\_  
(Signature of certifying agent)

\_\_\_\_\_  
(Printed name of certifying agent)

\_\_\_\_\_  
(Title of certifying agent)

\_\_\_\_\_  
(Date of Certification)



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

**CONSTRUCTION CONTRACTS**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(D) The contractor and its subcontractors shall furnish such reports or other documents to the Dept. of LWD, Construction EEO Monitoring Program as may be requested by the Dept. of LWD, Construction EEO Monitoring Program from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Dept. of LWD, Construction EEO Monitoring Program for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code (NJAC 17:27-1.1 et seq).**

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

Firm Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

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

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

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

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

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

1. The Contractor shall recruit prospective employees through the State Job bank website, managed by the Department of Labor and Workforce Development, available online at <http://NJ.gov/JobCentralNJ>;
2. The Contractor shall keep specific records of its efforts, including records of all individuals interviewed and hired, including the specific numbers of minorities and women;
3. The Contractor shall actively solicit and shall provide the **[Reporting Agency]** with proof of solicitations for employment, including but not limited to advertisements in general circulation media, professional service publications and electronic media; and
4. The Contractor shall provide evidence of efforts described at 2 above to the **[Reporting Agency]** no less frequently than once every 12 months.
5. The Contractor shall comply with the requirements set forth at N.J.A.C. 17:27-1.1 et seq.

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



**STATEMENT OF OWNERSHIP DISCLOSURE**

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

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

**Name of Organization:** \_\_\_\_\_

**Organization Address:** \_\_\_\_\_

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

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

**Part II**

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

**OR**

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

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

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

--	--

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

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

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

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

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

**Part IV Certification**

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

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



NON-COLLUSION STATEMENT

Date: \_\_\_\_\_

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

To Whom It May Concern:

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

Signature: \_\_\_\_\_

Corporate Seal:

Attest by: \_\_\_\_\_

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

My commission Expires: \_\_\_\_\_

Notary Public

THIS STATEMENT MUST BE COMPLETED AND SIGNED



## INFORMATION AND INSTRUCTIONS

### For Completing the “Two-Year Vendor Certification and Disclosure of Political Contributions” Chapter 51 Form

#### Background Information

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

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

#### Two-Year Certification Process

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

**State Agency Instructions:** Prior to the awarding of a contract, the State Agency should first use NJSTART (<https://www.njstart.gov/bsol/>) to check the status of a vendor’s Chapter 51 certification before contacting the Review Unit’s mailbox at [CD134@treas.nj.gov](mailto: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](mailto: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](mailto: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>.



State of New Jersey  
Department of the Treasury

**Division of Purchase and Property**

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

**FOR STATE 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 _____
<b>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.</b>

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:

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

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

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

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

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

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

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

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

Signed Name \_\_\_\_\_ Print Name \_\_\_\_\_

Title/Position \_\_\_\_\_ Date \_\_\_\_\_

**Procedure for Submitting Form(s)**

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

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

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

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

State of New Jersey

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN

Solicitation Number: Bidder/Offeror:

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

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

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

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

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

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

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

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

Full Name (Print): Signature:

Title: Date:



## VENDOR QUALIFICATION SHEETS

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

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

### TO BE COMPLETED BY VENDOR

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

A.

B.

C.

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

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

Name: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email Address: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

**Federal Identification Number:** \_\_\_\_\_

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

#### **Purchase Orders:**

Firm Name: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

#### **Remittances:**

Firm Name: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_



**VENDOR QUALIFICATIONS- continued**

5. Name of insurance company:

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

Types of Insurance: \_\_\_\_\_

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

Name: \_\_\_\_\_

Telephone: \_\_\_\_\_

Email Address: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

9. Is your firm incorporated?      **Yes** \_\_\_\_ **No** \_\_\_\_

A) In What State? \_\_\_\_\_

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

**Small Business:**      **Yes** \_\_\_\_ **No** \_\_\_\_

A) What category does your firm fall under?

Gross Revenues do not exceed \$500,000      \_\_\_\_\_

Gross Revenues do not exceed \$5 million      \_\_\_\_\_

Gross Revenues do not exceed \$12 million      \_\_\_\_\_

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

1. Is more than fifty percent (50%) of your company minority owned? (circle one)      YES      NO  
(African-American, Hispanic, Asian, and/or Native American)
  
2. Is more than fifty percent (50%) of your company woman owned? (circle one)      YES      NO
  
3. What is the ethnicity of the owner of your company: (check applicable according to 51% ownership)
  - ... Asian American
  - ... Multiple Ethnicities
  - ... Non-Minority
  - ... Hispanic American
  - ... African American
  - ... Caucasian American Female
  - ... Native American
  - ... Unspecified

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

**EXECUTIVE ORDER #34: MINORITY AND WOMEN BUSINESS ENTERPRISES**

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

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

**VENDOR QUALIFICATIONS-**

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

**A.      Client Name:**

**Contact Name:**

**Telephone Number:**

**Fax Number:**

**Email Address:**

**B.      Client Name:**

**Contact Name:**

**Telephone Number:**

**Fax Number:**

**Email Address:**

**C. Client Name:**

**Contact Name:**

**Telephone Number:**

**Fax Number:**

**Email Address:**

**D. Client Name:**

**Contact Name:**

**Telephone Number:**

**Fax Number:**

**Email Address:**

**VENDOR QUALIFICATIONS- continued**

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

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

Yes \_\_\_\_\_

No \_\_\_\_\_

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

Yes \_\_\_\_\_

No \_\_\_\_\_

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

Yes \_\_\_\_\_

No \_\_\_\_\_

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

Yes \_\_\_\_\_

No \_\_\_\_\_

Firm Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



- (a) The Contractor's Bid excluding limitations and qualifications unless such limitation or qualification is specifically accepted in writing by the College;
- (c) Addenda and Clarifications issued before the bid due date;
- (d) The Project Bidding Schedule; and
- (e) Modifications issued after execution of this Contract for Construction.

These documents all form the "Contract," and are as fully a part of this Contract as if attached hereto or repeated herein. This Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral.

### **ARTICLE 3** **SCOPE OF WORK**

**3.1** The Contractor shall fully perform the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others. The Contractor shall assume full responsibility for constructing and completing the Project and all the Work, including providing all labor, Subcontractors, materials, equipment, and services reasonably inferable from the Contract Documents and all applicable laws, codes and professional standards, and providing all supervision, management, and scheduling required in the General Conditions and as noted throughout the Contract Documents.

### **ARTICLE 4** **CONTRACT TIMES**

**4.1 TIME OF THE ESSENCE.** All dates and durations specified in this Contract, including the Construction Start Date(s), any Milestones Dates, any Substantial Completion Date(s) and any Final Completion Date(s) (collectively, "Contract Times") are agreed to be of the essence.

**4.2 CONSTRUCTION START.** The Work shall start no later than ten (10) calendar days after the College issues a Notice to Proceed to the Contractor ("Construction Start Date"). If the Work is to be performed in phases, the College may issue a separate Notice to Proceed with respect to each phase (e.g., Phase 1 Notice to Proceed, Phase 2 Notice to Proceed, etc.) thereby establishing different Construction Start Dates for each phase (e.g., Phase 1 Construction Start Date, Phase 2 Construction Start Date, etc.). The College may, in its sole discretion and at no cost to the College, choose to delay the issuance of a Notice to Proceed and the Construction Start Date for any phase until after the Contractor has achieved Substantial or Final Completion of any other phase.

**4.3 MILESTONES.** The construction tasks or activities shall be completed within the number of calendar days after the Construction Start Date as set forth in the Notice to Proceed ("Milestone Dates"). If the Work is to be performed in phases, each phase may have

separate Milestone Dates (e.g., Phase 1 Milestone Dates, Phase 2 Milestone Dates, etc.), which dates shall be set forth in the Notice to Proceed for that phase.

**44 SUBSTANTIAL COMPLETION.** The Contractor shall diligently prosecute the Work and shall achieve Substantial Completion of the entire Work as set forth in the Notice to Proceed (“Substantial Completion Date”). If the Work is to be performed in phases, each phase may have a separate Substantial Completion Date (e.g., Phase 1 Substantial Completion Date, Phase 2 Substantial Completion Date, etc.), which date shall be set forth in the Notice to Proceed for that phase. The definition and requirements of Substantial Completion are set forth in the General Conditions. The Substantial Completion Date(s) shall only be changed by a written change order.

**45 FINAL COMPLETION.** The Contractor shall achieve Final Completion of the entire Work as set forth in the Notice to Proceed (“Final Completion Date”). If the Work is to be performed in phases, each phase may have a separate Final Completion Date (e.g., Phase 1 Final Completion Date, Phase 2 Final Completion Date, etc.), which date shall be set forth in the Notice to Proceed for that phase. The requirements for Final Completion are defined in the General Conditions as well as the Specifications of the Project. The Final Completion Date(s) shall only be changed by written change order.

**46 LIQUIDATED DAMAGES FOR DELAY.** If the Contractor fails to achieve Substantial Completion of a phase of the Work or of the entire Work by the Substantial Completion Date(s) set forth in the applicable Notice to Proceed (as extended by Change Order, if applicable), and the delay is not excused by the College, then the Contractor shall pay the College the following amounts as liquidated damages for delay (“Liquidated Damages”) for each calendar day that the phase of the Work or the entire Work is not substantially completed beyond the applicable Substantial Completion Date:

1/20<sup>th</sup> of 1% per calendar day.

The College and the Contractor agree that the actual loss to the College from construction delays and the inability to use the Project or any phase of the Project in a substantially completed state are for the most part difficult to quantify, and that the foregoing Liquidated Damages formula results in damages amounts that are a reasonable estimate of the damage to the College for not being able to use the Project in a substantially completed state and are not penalties and are not intended to be penalties. The College may deduct Liquidated Damages from payments due under this Contract, but its failure to withhold Liquidated Damages or to assert a claim for Liquidated Damages shall not be deemed a waiver of the College’s right to withhold or to assert a claim for damages for any delay that occurs at any time on the Project.

**ARTICLE 5**  
**CONTRACT PRICE**

**51 CONTRACT PRICE.** The Contractor shall be paid \$\_\_\_\_\_ for the complete performance of this Contract, which was proposed by the Contractor in its bid and accepted by the College (the "Contract Price"). The Contractor shall be entitled to additional compensation for authorized changes which include the cost of the changes and mark-ups included in change orders approved in writing by the College in accordance with the change order provision set forth in the General Conditions.

**52 ALTERNATES.** The Contract Price is based upon and includes the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the College:

[\_\_\_\_\_]

**53 UNIT PRICES.** The Contract Price is based upon and includes the following unit prices, if any, which are described in the Contract Documents:

[\_\_\_\_\_]

**54 ALLOWANCES.** The Contract Price is based upon and includes the following allowances, if any, which are described in the Contract Documents:

[\_\_\_\_\_]

**ARTICLE 6**  
**PAYMENTS TO THE CONTRACTOR**

**6.1 PAYMENT.** The Contractor will be paid by the College in accordance with this Article and the payment provision in the General Conditions.

**6.2 MONTHLY PROGRESS PAYMENTS.** The College will make progress payments as the Work proceeds based on written invoices submitted monthly by the Contractor and approved by the Architect and the College. No payments will be made until the Contractor submits a unit schedule break down showing the portions of the total Contract Price for each principal category of Work and value loaded CPM schedule allocating the Contract Price among the schedule activities. Monthly progress payment amounts shall be based on the percentages of the Work completed as of the end of the pay period (less earlier payments). All payment requests or invoices and all payments shall be governed by the payment provision of the General Conditions as well as any special requirements of this Contract, including the requirement that progress payments shall be based on a unit schedule breakdown and a value loaded CPM schedule.



**6.3 RETAINAGE.** The College will retain 2% of the amount due on each progress payment pending Final Completion of the Work. The holding and release of retainage shall be governed by the payment provision of the General Conditions.

**6.4 CHANGE ORDERS.** The Contractor shall invoice for change order work in the monthly progress payment invoices as the change order work is performed, but only after a written change order and TCNJ issued Purchase Order has been signed by the College. Changes in the Work shall be governed by the change order provision of the General Conditions.

**6.5 FINAL PAYMENT.** Upon final completion of all Work included in the Contract Documents including all change orders, acceptance of the Work by the Architect and the College, the satisfactory completion of all of the requirements in the General Conditions for final completion, and the issuance of the Certificate of Final Completion, the Contractor will be paid the fully adjusted Contract Price including any retainage withheld (less earlier payments). The invoice for final payment and final payment shall also be subject to the payment provision of the General Conditions and any special requirements of this Contract.

**6.6 PAYMENT TERMS.** All invoices and payments shall also be subject to the General Conditions, including the provisions regarding payments, to the right of the College to withhold payments or to make deductions from payments, and to the Prevailing Wage Act requirements set forth in the General Conditions. The College will pay proper final invoices within thirty (30) days of their submission to the College with the approval of the Architect.

**6.7 SUBMISSION OF INVOICES.** Prior to the submission of the invoice, the Contractor will submit to the College and the Architect, in draft form, a “pencil copy” of the monthly invoice for review and approval setting forth each line item for which the Contractor intends to request payment in that invoice based on the claimed percent completed for that line item. Upon receipt of said “pencil copy”, the College and the Architect shall observe the Work in place and, on the basis of such observations, will either approve the amounts requested or modify the Contractor’s request, based on the College’s independent assessment of the Work in place. The College will then return the pencil copy invoice to the Contractor for the Contractor to then adjust and submit the final invoice with the agreed to percentages completed per line item to the College for payment. No invoice shall be submitted for payment until all amounts and completion percentages have been determined in this manner.

**6.8 PROMPT PAYMENT ACT.** For the purposes of the State’s Prompt Payment Act, N.J.S.A. 2A:30A-1, et seq.:

(a) An invoice will be deemed to have been received when it is received by the College at the address designated in the pre-construction conference for receipt of the invoices.

(b) The “billing date” as that term is used in N.J.S.A. 2A:30A-2 shall be the earlier of the date upon which an invoice for payment is approved for payment or 20 days after the invoice is received, unless within such 20 day period the invoice is found to be incomplete or

otherwise unacceptable and returned to the Contractor, with a written explanation of deficiencies, the amount withheld and the reasons for withholding payment.

(c) In the event that an invoice is found to be deficient and returned to the Contractor, the “billing date” shall be calculated from the date that a corrected invoice is received.

(d) Payment shall be considered to have been made on the date on which a check for such payment is dated.

(e) Payment terms (e.g., “net 20”) offered by the Contractor shall not govern the College’s obligation to make payment.

(f) The following periods of time will not be included in the calculation of the due date of the Contractor’s invoice:

(i) Any time elapsed between receipt of an improper invoice and its return to the Contractor, not to exceed 20 calendar days; or

(ii) Any time elapsed between the College’s return of an improper invoice to the Contractor and the College’s receipt of a corrected invoice.

If the State’s Prompt Payment Act is amended, or the language stated herein is inconsistent with the language contained in the State’s Prompt Payment Act, the language of the State’s Prompt Payment Act shall control.

**6.9 LIMITATIONS ON APPLICABILITY.** The provisions of this Article shall not govern the College’s payment obligations nor shall they supersede or modify any other contractual provision allowing the withholding of monies from the Contractor to the extent that the Contractor has not performed in accordance with the provisions of the Contract Documents. This Article also shall not govern the College’s payment obligations nor supersede or modify any other contractual provision governing the Contractor claims for additional compensation beyond the base Contract Price and approved change orders.

**6.10 INTEREST.** Interest shall be payable on amounts due the Contractor if not paid within thirty (30) calendar days after the billing date specified above, as provided under the State’s Prompt Payment Act, N.J.S.A. 2A:30A-1, et seq. Interest on amounts due shall be payable to the Contractor for the period beginning on the day after the required payment date and ending on the date on which the check for payment is drawn. Interest may be paid by separate payment to the Contractor, but shall be paid within 30 days of payment of the principal amount of the approved invoice. Nothing in this Article shall be construed as entitling the Contractor to payment of interest on any sum withheld by the College for any reason permitted under the Contract Documents or applicable law, or on any claim for additional compensation, over and above sums due under the base Contract Price or approved change orders.

**ARTICLE 7**  
**DISPUTE RESOLUTION**

**7.1** If a dispute or claim arises out of or relates to this Contract, or the breach thereof, and if the dispute cannot be settled through negotiation, the method for resolution of such dispute or claim shall be as provided in the dispute resolution provision of the General Conditions.

**ARTICLE 8**  
**TERMINATION OR SUSPENSION**

**81** This Contract may be terminated by the College as provided in the termination and suspension provision in the General Conditions.

**82** The Work may be suspended by the College or the Contractor as provided in termination and suspension provision in the General Conditions.

**ARTICLE 9**  
**INSURANCE AND BONDS**

**9.1 CONTRACTOR'S INSURANCE.** The Contractor shall purchase and maintain insurance as set forth in the insurance and bonds provision of the General Conditions. To the extent the Contractor shall be required to purchase and maintain additional insurance or insurance that differs from that set forth in the General Conditions, such requirements are set forth below:

[ \_\_\_\_\_ ]

**9.2 SUBCONTRACTOR'S INSURANCE.** The Contractor shall ensure that its Subcontractors purchase and maintain insurance as set forth in the insurance and bond provision of the General Conditions.

**9.3 PAYMENT AND PERFORMANCE BOND.** The Contractor shall furnish the College with a payment bond and a performance bond as set forth in the insurance and bond provision of the General Conditions.

**ARTICLE 10**  
**OTHER PROVISIONS**

**10.1 CONTRACTOR REPRESENTATIONS.** The Contractor represents to the College that it has:

(a) **Examination of the Contract Documents.** Examined and carefully studied the Contract Documents and the other documents in the bid documents, and that they are sufficient for performing the Work at the Contract Price.

(b) **Examination of Site.** Visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect the cost, progress, and performance of the Work.

(c) **Familiarity with Law.** Familiarized itself with all federal, state, and local laws and regulations that may affect the cost, progress, and performance of the Work.

(d) **Familiarity with Other Information and Other Documents.** Carefully studied all reports of investigations and tests of the site and subsurface conditions at or contiguous to the site and all drawings of physical conditions at the site including surface or subsurface composition, water, structures and utilities at or near to the site.

(e) **Additional Information Not Required for Bidding or Contract Performance.** Does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price.

**10.2 ASSIGNMENT OF CONTRACT.** The Contractor may not assign this Contract or any rights under or interests in this Contract including its right to payments under this Contract.

**10.3 CONTRACTOR PERSONNEL ASSIGNED.** The Contractor's team for this Project shall consist of the following personnel, who shall not be reassigned without the College's prior written consent:

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

The College reserves the right to request and have any member of the Contractor's or Subcontractor's staff replaced on the Project for any non-discriminatory reason.

**10.4 NOTIFICATIONS/AUTHORIZED REPRESENTATIVE.** All Notices required under this Contract shall be in writing, signed by the party giving same, and shall be deemed properly given only if hand delivered, sent by reputable overnight courier, or by registered or certified U.S. mail, return receipt requested, postage pre-paid and addressed as provided below.

**Notice to the Contractor/Contractor's Representative.** Written notices from the College and/or the Architect to the Contractor should be addressed to the Contractor's Representative:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Attn: \_\_\_\_\_

**Notice to the College/College's Representative:** Written notices from the Contractor to the College should be addressed to the College's Representative:

The College of New Jersey  
PO Box 7718,  
Ewing, New Jersey 08628  
Attn: \_\_\_\_\_

with a copy to the College's General Counsel as follows:

Thomas Mahoney, Esq.  
Vice President and General Counsel  
The College of New Jersey  
PO Box 7718  
Ewing, NJ 08628-0718

The College's Contracting Officer hereby authorizes the College's Representative to receive all Contract related correspondence.

**Notice to the Architect:** Written notices from the Contractor to the Architect should be addressed to:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Attn: \_\_\_\_\_

Neither the College's nor the Contractor's Authorized Representatives shall be changed without 7 days' written notice to the other party.

**10.5 CONTRACT TERMS, CHANGES, AND LAW.** This Contract constitutes the entire agreement between the College and the Contractor, and it shall be governed by the law of the State of New Jersey. The terms and conditions of this Contract may not be changed except by a writing signed by the Contractor and the College.

**10.6 COUNTERPARTS AND SIGNATURES.** This Contract may be executed in counterparts. All executed counterparts shall constitute one contract, and each counterpart shall be deemed an original. The parties hereby acknowledge and agree that facsimile signatures or signatures transmitted by electronic mail in so-called “pdf” format shall be legal and binding and shall have the same full force and effect as if an original of this Contract had been delivered. The College and the Contractor (1) intend to be bound by the signatures on any document sent by facsimile or electronic mail, (2) are aware that the other party will rely on such signatures, and (3) hereby waive any defenses to the enforcement of the terms of this Contract based on the foregoing forms of signature.

**10.7 NO IMPLIED COVENANTS OR WARRANTIES.** The Contractor acknowledges that there are no implied covenants or warranties from the College under this Contract.

**10.8 SEVERABILITY.** If any term or provision of the Contract Documents are to any extent held invalid or unenforceable, and if the provisions of the Contract Documents that are essential to each party’s interests otherwise remain valid and enforceable, then (i) the remaining terms and provisions in the Contract Documents will not be affected thereby, (ii) each term and provision of the Contract Documents will be valid and enforceable to the fullest extent permitted by law, and (iii) the court/arbitrator(s) will give the offending provision the fullest meaning and effect permitted by law.

**10.9 HEADINGS.** The headings used in this Contract are for convenience and reference only, and are not part of this Contract, and do not in any way control, define, limit or add to the terms and conditions hereof.

**10.10 INTERPRETATION/RULES OF CONSTRUCTION.** The parties acknowledge that each party, and if it so chooses, its counsel, have reviewed and revised this Contract and that the normal rule of construction to the effect that any ambiguities be resolved in favor of the non-drafting party shall not be employed in the interpretation of this Contract or any amendments or exhibits thereto.

**THE COLLEGE OF NEW JERSEY**

By \_\_\_\_\_  
William Rudeau,  
Director of Construction

By \_\_\_\_\_  
Lloyd Ricketts,  
Vice President and Treasurer

Date \_\_\_\_\_

Date \_\_\_\_\_

By \_\_\_\_\_  
Michael Dixon,  
Vice President for Facilities Management

By \_\_\_\_\_  
Anup Kapur,  
Executive Director of Procurement

Date \_\_\_\_\_

Date \_\_\_\_\_

**CONTRACTOR:**

By \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_



**GENERAL CONDITIONS  
OF THE  
CONTRACT FOR CONSTRUCTION**

Last Revised January 2019



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**ARTICLE 1**  
**CONTRACT DOCUMENTS, INTERPRETATION, INFORMATION FOR BIDDERS,  
CLAIMS BASED ON BID AND CONTRACT DOCUMENTS**

**1.1 Definitions.**

Terms defined in the Contract for Construction shall have the meaning provided therein. Definitions for the purpose of these General Conditions include the following:

Addendum: A document issued to bidders by the College prior to the bid due date which supplements, revises or modifies the bid solicitation documents furnished for bidding purposes, and which must be identified and included in bids for the Contract.

Architect: The Architect (A/E) engaged by the College to design the Project, to prepare the design documents and assist with bid documents, and may administer the Contract and act as the agent of the College as described in the Contract.

Bulletin: A document prepared by the Architect describing proposed changes or additions to the Work in the Contract Documents that is issued after Contract award. If the College decides to implement the change, it will provide the bulletin to the Contractor and ask it to submit a change order proposal or request (in accordance with the change order provisions in the Contract for Construction, these General Conditions and other sections of the bidding documents).

Change Order Proposal or Change Order Request: A written proposal or request submitted by the Contractor in accordance with the change order provision of the Contract for Construction, these General Conditions and other sections of the bidding documents, including proposals submitted in response to Contract Change Directives, which proposes cost, time and other terms under which the Contractor will perform changed work under the Contract. If accepted by the College, a written change order signed by the Vice President for Administration and a TCNJ Purchase Order signed by the Contracting Officer of the College, and if accepted by the Contractor in writing, it will become part of the Contract as a change order.

The College's Representative: The College's Representative is a person or persons designated by the College to act on its behalf in administering the Contract for the College. The College's Representative may include the Director of Campus Construction, the Project Manager or an independent construction manager working for the Office of Campus Construction.

College Site Superintendent: The College Site Superintendent is a person or persons designated by the College to witness, observe, record and report on activities in and around the construction site. The Site Superintendent does not have the authority to stop or change the scope of the Work of the Contract Documents.

Contract: The Contract Documents all form the Contract. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual

relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the College and a Subcontractor or a Sub-subcontractor, (3) between the College and the Architect or the Architect's consultants or (4) between any persons or entities other than the College and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's Contractor's duties.

Contract Amendment: The Contract can only be amended by (1) a written amendment identified as such that is signed by the College and the Contractor, (2) a change order signed in accordance with the Contract Documents, (3) a written Contract Change Directive (CCD) issued by the College that should result in a change order unless issued to address some fault of the Contractor, (4) a written approval or acceptance by the College or the Architect of a change requested by the Contractor in writing, provided the request for a change is specifically identified in a submittal.

Contract Change Directive (CCD): A Contract Change Directive (CCD) is a written directive issued by the College which orders an addition, deletion, clarification of a disputed item or revision in the Work, or a response to an emergency. A CCD does not by itself change the Contract, but it should result in a change order which does change the Contract Price or Contract Times if warranted. A CCD should specify the terms of the change order (if deemed warranted by the College) which will result, and/or specify a deadline for the submission by the Contractor of a proper change order request, and/or contain other similar terms.

Contract Documents: The Contract Documents are enumerated in Article 2 of the Contract for Construction.

Contract Limit Lines: The lines shown on the Plans that limit the boundaries of the Project site, and beyond which no construction work or activities shall be performed by the Contractor unless otherwise specified in the Contract Documents, including the Plans and Specifications and supplemental General Conditions.

Contracting Officer: The Associate Treasurer of the College shall be the Contracting Officer in connection with the Contract and the Project. The Contracting Officer and other designee shall have authority to act on behalf of the College under the Contract.

Field Order (FO): A written order issued by the Architect or the College which requires minor changes in the Work that do not result in a change in the Contract Price or the Contract Times. If the Contractor believes that a field order warrants the issuance of a change order that changes the Contract Times or Contract Price, it must notify the College and the Architect in writing within 48 hours, and its notice must specify the terms of the change order that it believes are warranted, including specific time and price change requests.

Plans: The Plans are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, and diagrams.

Project: The Project is the total construction of the Work performed under the Contract Documents and may include construction by the College and by separate contractors that the College has specifically identified.

Specifications: The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services prepared by the Architect or the College.

Supplemental General Conditions: The part of the Contract Documents which amends or supplements these General Conditions for the Project.

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

## **1.2 Intent Of Contract Documents.**

The intent of the Contract Documents is to describe a functionally complete and aesthetically acceptable Project to be constructed and completed by the Contractor in every detail in accordance with the Contract Documents. Any Work, services, materials, equipment or documentation that may be reasonably inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce a complete Project shall be supplied by the Contractor whether or not specifically identified at no additional cost to the College. Where the Contract Documents describe portions of the Work in general terms but not in complete detail, only the best construction practices and only materials and workmanship of the first quality are to be used. Only where the Contract Documents specifically describe a portion of the Project as being performed by others is the Work to be considered to include less than the entire Project.

## **1.3 Interpretation Of Contract Documents.**

When two or more interpretations of a Specification for the Work are possible, the most stringent or the highest cost interpretation shall apply as determined by the Architect. The Architect (or in the absence of the Architect, the College) shall be the sole interpreter of the Plans and Specifications and the Contractor's performance therewith. It is the intent of these Plans and Specifications to provide materials of a quality consistent with the highest standards provided under similar circumstances in the same general geographical area and that will result in long-term use and efficient operation.

## **1.4 Law And Referenced Standards.**

The Contractor is required to comply with all federal, state and local laws and regulations that apply to the Project, the Work and the Contract. Where the Contract Documents refer to any publication, including but not limited to any standard, which affects any portion of the Work or the Project, it shall be considered to mean the edition or revision in effect on the bid due date unless otherwise specified in the Contract Documents. No provision in any publication including



any standard shall create an obligation on the part of the College or the Architect to supervise or direct the Contractor's Work.

### **1.5 Plans And Specifications.**

The Plans will include general plans and such details as deemed necessary to give a comprehensive representation of the construction required. The Contractor shall keep one set of Plans available at the Project site, which shall be available for inspection by the College and the Architect at all times. All alterations affecting the requirements in the Plans must be authorized by the College and the Architect in writing, and shall be promptly noted on the Contractor's record set of Plans, which are maintained at the site for inspection by the Contractor, the College and the Architect.

### **1.6 Order Of Precedence Of Contract Documents.**

Each of the Contract Documents is an essential part of the Contract, and a requirement specified in one part of the documents is binding as if specified in all. The Contract Documents are intended to be complementary and to describe and provide for a complete Project. The obligations of the Contractor under the various Contract Documents shall be cumulative and to the extent that one of the Contract Documents imposes a stricter or more costly requirement or higher standard upon the Contractor than does another Contract Document, the more stringent or more costly requirement or higher standard, as determined by the Architect, shall apply. Otherwise, if there is any conflict among the Contract Documents, the signed Contract for Construction and all approved change orders shall control. As to the other Contract Documents, the order of precedence shall be as follows:

- (a) Contract for Construction
- (b) Addenda
- (c) Supplemental General Conditions
- (d) General Conditions
- (e) Specifications
- (f) Plans
  - i. Notes
  - ii. Large Scale Details
  - iii. Sections
  - iv. Elevations
- (g) Scope of Work Description

### **1.7 Organization Of Plans And Specifications.**

The arrangement of the Plans and the organization of the Specifications into divisions, sections or articles shall not be construed by the Contractor as being intended to divide or allocate the Work among Subcontractors or trades or to establish the scope of the Work to be performed by particular Subcontractors or trades. The College is not liable for the Contractor dividing and separating the Contract Documents into individual packages to Subcontractors. Items that the Contractor fails to include or provide for shall be at the Contractor's sole risk and

cost. The Contract Documents work together as a whole and, therefore, the Contractor is required to coordinate the entire package with all its Subcontractors.

### **1.8 Required Approvals.**

In all cases where approvals or decisions under the Contract Documents are required from the College, the Work shall not proceed without the required approvals and decisions in writing.

### **1.9 Conformity Of Work To Contract Documents.**

All Work performed shall conform to the lines, grades, cross-sections, dimensions, material requirements, tolerances, details and other information in the Contract Documents. The purpose of tolerances is to accommodate occasional minor variations from the middle portion of the tolerance range that are unavoidable despite reasonable construction practices. When a maximum or minimum tolerance value is specified, the material and the Work shall be controlled so that they shall not be preponderantly of borderline quality or dimension.

### **1.10 Work Involving Existing Structures.**

On projects involving alterations, remodeling, repairs, installations or other work in pre-existing structures or systems, the Contractor shall by personal inspection of the existing structures and systems satisfy itself as to the accuracy of any information provided that may affect the quantity, size and/or quality of materials required for a satisfactorily completed Project, including information that is not identified or included in the Plans and Specifications. The Contractor shall provide all material and labor required to complete the Work based on conditions that can be reasonably observed by a competent and diligent contractor before bidding.

### **1.11 Verification Of Dimensions.**

The Contractor shall verify all dimensions at the job site and shall take any and all measurements necessary to verify the information in the Plans. The Contractor shall properly and accurately layout and survey the Work. Any errors or discrepancies affecting the layout of the Work shall be reported to the Architect and the College immediately in writing. No Work affected by any error or discrepancy shall proceed until such discrepancy is resolved by a written decision of the Architect with the consent of the College.

### **1.12 Manufacturer Literature.**

Manufactured articles, materials and equipment shall be installed, applied, connected, erected, used, cleaned and conditioned in accordance with the manufacturer's written instructions unless otherwise specified in the Contract Documents. If there is any conflict between manufacturer literature and the Contract Documents, it shall be reported by the Contractor to the Architect and the College in writing, and the Contractor shall not proceed without a written decision by the Architect with the consent of the College.

### **1.13 Quality -- General Requirement.**

Where no explicit quality or standard are specified for Work, materials or equipment, they shall be new, of good quality, free of defects, suitable for their intended use, in conformity with the Contract Documents, and consistent with the highest quality of the surrounding Work and of the construction of the Project generally.

### **1.14 Examination Of Contract Documents Before Bidding/Errors.**

The Contractor represents and warrants that before bidding it examined and carefully studied the Contract Documents and other documents included or referred to in the bid documents. The Contractor also represents and warrants that the documents are sufficient for bidding and performing the Work at the Contract Price. Should it appear that any of the Work or materials are not sufficiently or properly detailed or explained in the Contract Documents, the Contractor shall notify the College in writing before the bid deadline for submitting questions.

Errors, omissions, conflicts, discrepancies, inconsistencies or other defects in the Contract Documents or between the Contract Documents and any codes, standards or other applicable documents which are capable of being discovered by a diligent and competent contractor before bidding shall be reported to the College in writing before the bid deadline for submitting questions. If errors, omissions, inconsistencies or other defects in the Contract Documents are not discovered until after the bid due date, the Contractor shall promptly notify the College and the Architect of them in writing, provide written recommendations regarding changes or corrections to resolve any such errors, omissions, inconsistencies or defects, and obtain the Architect's written interpretation and approval with the consent of the College before proceeding with the Work affected.

### **1.15 Site Information.**

Soil borings, test pits or other subsurface or site information regarding the physical site and subsurface conditions on or near the site may have been obtained from independent contractors for the purpose of preparing the design documents for the Project rather than for the purpose of contractor estimating or bidding. Such information may be identified or included in the Contract Documents so that it can be reviewed by bidders during the bidding phase, but because of the limited nature and purpose of the information, it shall not be considered to be part of the Contract Documents, and the Contractor must assume responsibility for interpreting and relying upon the information.

### **1.16 Sufficiency Of Documents Provided For Bidding.**

The Contractor represents and warrants that before bidding it carefully studied all reports, surveys and documents included or identified in the bid documents regarding observations, inspections, investigations and tests of the site and subsurface conditions at or near the site, and all information provided to bidders regarding physical conditions at or near the site, including surface and subsurface composition, water, structures and utilities, and that it determined that no further examinations, investigations, tests, studies or data were necessary for bidding or the performance of the Work at the Contract Price. If the Contractor concluded that additional

information is required, it must notify the College in writing before the bid deadline for submitting questions.

### **1.17 Examination Of Site Before Bidding.**

The Contractor represents and warrants that before bidding it visited the site and familiarized itself with and was satisfied as to the general, local and site conditions which may affect the cost, progress and performance of the Work and the Contract, and that its bid and bid price take into account all such conditions. No additional costs will be borne by the College for conditions that existed and were reasonably observable or described at the time of bidding.

### **1.18 Hazardous Materials On Site.**

The Contractor will not be responsible for hazardous environmental conditions uncovered or discovered on the site that were not disclosed in the Contract Documents and that were not caused by the Contractor or anyone working through or under the Contractor. If such conditions are discovered, the Contractor shall stop work and notify the College in writing immediately. The College may issue a written directive to the Contractor requiring it to stop work until the hazardous environmental condition is remedied, and the Contractor will be entitled to an extension of the Contract Times if an extension is warranted under the provisions of the Contract for Construction and these General Conditions regarding extensions. The College may also make changes in the Contract in response to the conditions, and the Contract will be changed in accordance with the change order provisions in the Contract for Construction and these General Conditions.

### **1.19 Limitation On Claims Based On Contract Documents And Information Provided For Bidding.**

The Contractor may not assert claims for extra compensation beyond the bid and Contract Price for constructing the completed Project by reason of any errors, omissions, inconsistencies, or defects in the Contract Documents that are discoverable by a diligent and competent contractor, because of (i) its obligation to review and study the bid documents before submitting its bid, (ii) its representation in the Contract Documents that it did so, and (iii) its obligation to notify the College in writing of any such errors, omissions, inconsistencies, or defects before submitting its bid,. In addition, the Contractor may not assert claims for extra compensation beyond the bid and Contract Price for constructing the completed Project by reason of any lack of information affecting the construction of the Project at the time of bidding, or errors in the information included or referenced in the bid documents except to the extent explicitly permitted by the Contract for Construction or these General Conditions. The Contractor shall notify the College in writing before submitting its bid of any errors or omissions in the information provided or be precluded from seeking extra compensation or asserting a claim. This limitation on claims may be modified and further restricted in the signed Contract for Construction when the Contract Documents explicitly require the Contractor to participate in any aspect of the design phase.

The Contractor may assert claims for extensions and additional compensation in accordance with the provisions of the Contract for Construction and these General Conditions if

information regarding the site that is identified in the bid or Contract Documents is factually inaccurate, and the inaccuracy is one that a reasonably competent and diligent contractor would not discover in preparing a bid. The Contractor may not assert a claim for an extension or extra compensation when it claims, not that the information is factually inaccurate, but rather that conclusions, inferences or judgments made in reliance on accurate information prove to be incorrect.

## **ARTICLE 2** **THE COLLEGE**

### **2.1 General Rights And Responsibilities Of The College.**

The College as the owner of the Project is entitled to have the Contractor perform and complete the Work in accordance with the Contract Documents, including the time of completion, quality and documentation requirements of the Contract. The College for its part undertakes to furnish the site, to notify the Contractor of any restrictions on the site that could affect the Contractor's performance of the Contract, to obtain approvals relating to the site that are needed for the construction to proceed, to pay the Contractor in accordance with the Contract, and to act reasonably in reviewing all documentation, claims and questions properly submitted to it under the Contract. The College also undertakes to provide the information and items that it expressly agrees in the Contract Documents to provide.

The College shall also have such other rights and responsibilities as are specified in the Contract Documents. The College will not supervise the Contractor's Work or be responsible for the Contractor's construction means and methods, or the Contractor's safety practices, or any failure of the Contractor to comply with the Contract Documents or any laws or regulations.

### **2.2 The College's Representative, Authority To Decide Contract Questions.**

The Contracting Officer delegates its authority to the College's Representative who is authorized to act and make decisions on behalf of the College regarding matters specified in the Contract Documents. However, the College's Representative is not authorized to make or agree to material changes to the Contract Documents or changes involving the Contract Times or Contract Price.

All changes to the Contract Documents including change orders that modify Contract Price, Contract Times or other material change to the Contract Documents must be reviewed and approved by the Contracting Officer or his/her designee. The Contracting Officer designates that the Vice President for Administration is authorized to approve change orders.

The College's Representative, in consultation with the Architect, is authorized to decide on behalf of the College, all questions regarding the quality, acceptability and rate of progress of the Work, all questions regarding the interpretation of the Contract Documents, the acceptability of the performance of the Contract by the Contractor, and the compensation due to the Contractor. Where the College's Representative is authorized to render decisions under the

Contract for Construction or these General Conditions regarding disputes or claims, he/she shall consult with the Architect and shall not act arbitrarily so as to unfairly benefit either the College or the Contractor.

### **2.3 Required Approvals.**

In all cases where approvals or decisions are required from the College under the Contract Documents, such approvals or decisions shall be made reasonably, except in cases where a specific standard applies such as, for example, situations where the College is entitled to exercise unqualified discretion in selecting the types of materials, products or construction which it decides to procure.

### **2.4 Information Required From The College.**

Information which the Contract Documents specify the College will provide shall be provided with reasonable promptness.

### **2.5 Permits.**

The College will arrange and pay for permits and permit inspections, including building code permits except to the extent that the Specifications specify otherwise. The Contractor will arrange for and coordinate all inspections and the dates and times for all inspections with local, state and independent agencies and include the College's Representative or the Site Superintendent.

### **2.6 The College's Inspection Of The Project.**

The College shall have the right to be represented at the site by the College's Representative(s), the Site Superintendent and other College employees designated by the College, the Architect, and other consultants designated by the College or the Architect. The College and its representatives shall have the right to visit the site, inspect Work and materials, inspect Project documentation, conduct tests, attend meetings, meet with the Contractor' and the Subcontractors' representatives, investigate problems, conduct studies, and make reports. The College and its representatives shall be allowed access to all parts of the Work, and the Contractor shall furnish them with information and assistance when they request it.

The Contractor shall give the College and the Architect timely notice of readiness of Work for observation, inspection and testing, and shall cooperate with these efforts. The Contractor shall also comply with any inspection and testing procedures specified in the Contract Documents.

The Contracting Officer, the Architect and the College's Representative shall have the right to direct the Contractor to remove or uncover unfinished Work if deemed necessary to inspect Work or materials in place.

If Work is covered before it is inspected because the College, the Architect or any consultant were not afforded reasonable notice and an opportunity to inspect, or where the

Contract Documents or any law require an inspection, the Contractor shall uncover and replace Work at its own expense if required to do so by the College.

If any other portion of the Work not specifically required to be inspected is covered, and the College or the Architect did not ask to observe or inspect the Work before it was covered, the College may nonetheless ask to inspect the Work. If the College makes such a request, the Contractor shall uncover the Work for inspection. If the Work uncovered is found to be in accordance with the Contract Documents, the cost of uncovering and replacement shall be paid by the College by a change order. If the Work uncovered is found not to be in compliance with the Contract Documents, the Contractor shall pay all costs of uncovering and replacement, and also remedy the defect or deficiency at its own cost.

The College at all times retains the right to stop all or part of the Work by a written direction because of defective Work until the defect is eliminated. This right shall not give rise to any duty on the part of the College to exercise the right for the benefit of the Contractor or those performing its Contract.

The College at all times retains the right to stop all or part of the Work due to concerns with the effectiveness of the Contractor's safety program required under Article 5.2. The College may require the Contractor to provide a written plan to correct safety deficiencies, an on-site safety supervisor, or other administrative or engineering controls to ensure the safety of personnel impacted or potentially impacted by Contractor operations. The Contractor shall indemnify, defend and hold the College harmless from fines issued by Federal, State or Local OSHA enforcement.

## **2.7 The College's Inspectors, Duties And Limitations**

If the College designates inspectors to inspect Work and materials and Project documentation, they will not be authorized to alter or waive any requirements or provisions in the Contract Documents. The College's inspectors will not be authorized to issue instructions contrary to the Contract Documents or to act as foremen or employees of the Contractor. The College's inspectors have the authority to reject unsuitable Work or materials, subject to written confirmation by the College's Representative. If the Contractor believes that any action of a College inspector is contrary to the Contract Documents, it shall notify the College's Representative and the Architect in writing within 48 hours. The College does not undertake to have inspectors sufficient in number to inspect every item of Work or material as it is provided, or to have inspectors with the expertise needed to judge every aspect of the Work.

The Contractor shall remain responsible for defective Work or materials irrespective of any inspections or lack of inspections during the Work. If the Contractor seeks a binding determination of the acceptability of Work or materials during the performance of the Contract, it shall do so by making a written request for such a determination to the College's Representative with a copy to the Architect.

## **2.8 The College's Rejection Of Defective Work.**

The College shall have the right to reject defective Work, materials, or equipment at any time, and to require the Contractor to remove and replace it at the Contractor's expense. The Contractor shall also be responsible for repairing damage to other work caused by defects or deficiencies in its Work. The College's Representative, upon consultation with the Architect, may elect to accept Work or materials that do not conform to the Contract Documents and to credit or reduce the Contract Price, but the College shall have no contractual obligation to elect this remedy. Changes to the Contract Documents in these circumstances shall be recorded as a change order under the change order provision of the Contract for Construction and these General Conditions.

## **ARTICLE 3** **THE ARCHITECT**

### **3.1 The Architect's General Role.**

The Architect is, by contract with the College, responsible for the design of the Project. During construction, the Architect is responsible for reviewing the Contractor's submittals to determine if they conform to the Contract Documents and good industry practice, to provide some level of inspection to determine if Work and materials provided by the Contractor conform to the Contract Documents and good industry practice, and to review the Contractor's payment applications. During the performance of the Work, the Architect may investigate any defects and deficiencies in the Work or materials provided and make recommendations to the College regarding the defects or deficiencies. The Architect will conduct inspections to determine if the Contractor has achieved proper Substantial and Final Completion and submitted all documents required at Substantial and Final Completion. The Contractor shall cooperate with and render assistance to the Architect in the performance of these duties.

### **3.2 The Architect's Access And Facilities.**

The Contractor shall allow the Architect and its consultants access to the Project at all times and shall facilitate their access to inspect Work and materials and Project documentation. The Architect and its consultants shall be permitted to attend job meetings, scheduling meetings and other meetings at the site and the Contractor shall facilitate their ability to do so. The Contractor shall provide an office at the site for the Architect if the Specifications require it to do so.

### **3.3 Limitation Of The Architect's Responsibilities.**

The Architect will not be responsible for or have control of construction means and methods or safety precautions and programs in connection with the Work. The Architect will not be responsible for or have control of acts or omissions of the Contractor, its Subcontractors, or any of their agents or employees, or any other person performing any of the Contract Work.



### **3.4 The Architect's Rejection Of Work.**

The Architect may recommend rejection of Work or materials that it believes does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, it may recommend to the College special inspections or testing of Work or materials, including completed Work and materials.

### **3.5 The Architect's Review Of The Contractor's Submittals.**

The Architect will review, approve or take other appropriate action regarding the Contractor's submittals, such as shop drawings, product data and samples, to assure that they conform with the design requirements and Contract Documents. The approval of a specific item shall not be deemed to constitute approval of an assembly of which the item is a component.

### **3.6 The Architect's Review Of The Contractor's As-Built Plans.**

The Architect will periodically review the Contractor's as-built plans maintained at the site to ensure that they are up-to-date, and shall review the completed as-built plans at Project completion to ensure that they are complete and are provided to the College.

### **3.7 The Architect's Determination Of Substantial and Final Completion.**

The Architect will conduct inspections to determine the dates of Substantial and Final Completion and to determine if the Contractor has properly Substantially and Finally completed the Project. The Architect will obtain from the Contractor all written warranties and all other documents that the Contractor is required to provide at Substantial and Final Completion of the Project.

## **ARTICLE 4** **THE CONTRACTOR**

### **4.1 The Contractor's Responsibility For Performance Of The Contract And Work.**

The Contractor is the person or entity identified as such in the Contract. The Contractor shall be lawfully licensed in the jurisdiction where the Project is located.

The Contractor shall perform all of the duties in the Contract Documents, shall furnish the labor, materials and equipment to complete the construction of the Project in accordance with the Contract Documents, and furnish all services, labor, materials and equipment necessary or appropriate to construct the Project. The Contractor shall manage, supervise, schedule, direct, and inspect the Work as competently, skillfully, and efficiently as possible, and shall be solely responsible for all construction means, methods, techniques, safety, security, sequences, procedures, and coordination.

The Contractor shall comply with all applicable laws, and shall establish and maintain reasonable quality assurance and safety programs in connection with its Work. The Contractor shall complete the Work in compliance with the Contract Documents and by Milestone, Substantial Completion and Final Completion Dates in the Contract for Construction or any authorized extensions thereof. The Contractor shall maintain good order and discipline at the site at all times.

#### **4.2 The Contractor's Key Personnel.**

The Contractor shall assign to the Project a Project executive, Project manager, superintendent, and scheduler, and such other key personnel as are specified in the Contract for Construction or as required to carry out the requirements of the Project. The Contractor shall not remove or replace such key personnel without the College's written approval. The College has the authority to reject and have replaced any staff member of the Contractor or any of the Subcontractors for any non-discriminatory reason.

#### **4.3 The Contractor's Supervision Of Contract Work/The Superintendent.**

The Contractor shall supervise and be responsible for the acts and omissions of the Contractor's employees, agents, Subcontractors, sub-subcontractors, suppliers and other persons performing portions of the Work and the Contract. The Contractor's designated Project superintendent shall be at the Project site at all times when Work is in progress. The Contractor may designate in writing an alternate superintendent who must be approved in writing by the College. The superintendent (or alternate) shall have full authority to represent and act for the Contractor at the site and shall have full authority to execute orders and directives of the College without delay.

Communications from the College or the Architect to the superintendent shall be deemed to have been given to the Contractor. The superintendent shall be capable of and authorized to respond to all hazardous and unsafe conditions at the Project site and to implement prompt corrective measures to eliminate all unsanitary, hazardous or dangerous conditions at the site. The College may suspend all or part of the Work at the Project site if the superintendent (or alternate) is not present at the Project site. Such a suspension shall not be the basis of a claim against the College, including without limitation any claim for additional time or extra cost.

The superintendent shall attend all meetings at the Project site including job meetings, scheduling meetings, and meetings with the College and/or the Architect. The superintendent shall have a written plan that must be approved in writing by the College for responding to emergencies when the Work is not in progress. The Contractor shall also utilize qualified competent craftsmen on the Project.

#### **4.4 Cooperation With The College And Other Contractors.**

The College reserves the right to contract for and perform other or additional work on or adjacent to the Project site. When separate contracts are let within the limits of the Project site, or in areas adjacent to the site, the Contractor shall perform its Work so as not to interfere with or

hinder the progress or completion of the work being performed by other contractors. The Contractor shall also affirmatively cooperate with such other contractors and coordinate its activities with theirs, and include coordination measures in the Project Schedule. The Contractor shall arrange its Work and shall place and dispose of materials being used so as not to interfere with the operation of other contractors within the limits of the Project site. The Contractor shall join its Work with that of the other contractors in an acceptable manner and shall perform its Work in proper sequence with that of other contractors.

If there is a disagreement as to the respective rights of the Contractor and others doing work within the limits of or adjacent to the Project site, the College shall determine the respective rights of the contractors involved to secure the satisfactory completion of all affected work. The Contractor shall not be entitled to additional compensation beyond its Contract Price that may arise because of inconvenience, delay, or loss experienced by it as a result of the presence and operations of other contractors working within the limits of or adjacent to the Project site.

The College reserves the right to occupy any portion of the Project that is ready for occupancy prior to Final Completion and acceptance of the Project, after Local and State Construction Enforcing Agency approval.

The occupancy of any portion of the Project does not constitute an acceptance of any Work nor does it waive the College's right to liquidated damages or constitute an acceptance of any Work, as the Project will be accepted as a whole and not in units. Prior to such occupancy, however, the Architect, a representative of the College, and the Contractor shall fully inspect the portions of the Project to be occupied, preparing a complete list of omissions of materials, faulty workmanship, or any items to be repaired, torn out or replaced. The College will assume responsibility for damage to premises so occupied of any items not on this list when such damage is due to greater than normal wear and tear, but does not assume responsibility for improper or defective workmanship or materials.

#### **4.5 Performance Of The College Directives.**

When the College issues a written directive to the Contractor under the authority of any provision in the Contract for Construction or these General Conditions, the Contractor shall perform as directed in a diligent manner and without delay. Compliance with written directives shall not adversely affect the rights of the Contractor under the Contract for Construction, these General Conditions or law, but if the Contractor objects to a directive of the College, or claims that a directive infringes upon its rights or entitles it to a change order, it shall notify the College in writing within 2 business days of any directive and describe any objection it has to the directive and the reasons for its objection. Objection to a written directive does not relieve the Contractor of the obligation to comply with the directive and proceed in a diligent manner to implement the directive without delay.

**ARTICLE 5**  
**PERFORMANCE OF WORK**

**5.1 Protection Of Work/Materials.**

The Contractor, shall at its own expense, protect all finished Work and materials from damage and keep them protected until the Project is accepted as Substantially Completed, and shall repair or replace any Work or material damaged before acceptance. After the Project is accepted as Substantially Complete, the Contractor will remain responsible up through Final Completion for damage to Work and materials caused by it or its Subcontractors or others participating in the performance of its obligations under the Contract Documents. The Contractor shall also secure and protect its own tools, equipment, materials and supplies, and the College shall have no liability for damage, theft or injury to the Contractor's property.

**5.2 Safety And Safety Programs.**

The Contractor shall have full responsibility for safety at the Project site at all times up to Final Completion and acceptance of the Project and the Contract. The Contractor shall provide for the safety of all individuals on the Project site, and take measures to ensure that individuals on or near the Project site are not injured by the performance of the Contract. The Contractor shall establish and maintain a Project safety program in accordance with all applicable laws including OSHA, good industry practice, and any additional requirements in the Contract Documents. If the College or the Architect become aware of an unsafe situation, the Contractor will immediately respond to remedy the safety concern and shall take all other actions necessary to comply with Article 2.6.

**5.3 Emergencies Affecting Safety.**

If there is an emergency affecting the safety of persons or property, the Contractor shall take immediate action to prevent damage, injury or loss. The Contractor shall notify the College in writing of the situation and all actions being taken immediately or as soon as possible. If, in the opinion of the Contractor, immediate action is not required, the Contractor shall notify the College in writing of the emergency situation and proceed in accordance with the College's instructions. However, if loss, damage, injury or death occurs that could have been prevented by the Contractor's prompt and immediate action, the Contractor shall be liable for all costs, damages, claims, actions, suits, attorney's fees and other expenses that result.

Any additional compensation or extension of time claims by the Contractor on account of emergency Work shall be determined in accordance with the change provisions of the Contract for Construction and these General Conditions. The Contractor shall be responsible for emergencies and costs and delays resulting therefrom that could have been foreseen or prevented with normal diligence, planning, and supervision of the Work, or that are caused by the Contractor's failure to properly perform the Contract.

The Contractor shall provide the College with a list of the names and telephone numbers of its employees and employees of each Subcontractor designated to be contacted in case of an emergency during non-working hours. A copy of this list shall be displayed prominently at the

Project site so that it is visible when the Project site is secured and shall be provided to the College's campus police department.

#### **5.4 Working Hours.**

Except as required for the safety or protection of persons or property, or as specified in the Contract Documents, all Work at the site shall be performed during regular working hours, and not on Saturdays, Sundays, legal holidays, the College's commencement days, resident move-in and move-out days or other days specifically noted in the Contract Documents without the prior written consent of the College, which will not be unreasonably withheld.

#### **5.5 Site Security.**

The Contractor shall provide, maintain and oversee security at the site if required in the Specifications. The Project site shall be fenced as specified in the Specifications, and the Contractor shall control access when gates are unlocked or open. The fence shall provide a physical barrier to the site and protection from visible nuisance. At a minimum, the fence shall be firmly secured with buried posts or weighted feet, top rails, metal fabric, and locking gates. Contractor shall immediately notify the College in the event of unauthorized entry to the site.

#### **5.6 Site Use.**

The Contractor shall confine construction equipment, storage and Work to the Project site absent written approval from the College. Any request by the Contractor to use areas outside the Project site must be described in written form and included with the Contractor's bid.

#### **5.7 Building Access.**

The Contractor shall be responsible for the sign out, distribution, safe use and return of all building keys and/or access cards, and shall be responsible for all costs associated with failure to return these items (e.g., the cost to re-key/re-implement the system).

#### **5.8 Minimize Interruption.**

The Contractor acknowledges that the College is an existing educational facility and that classes may be in session during construction. The Contractor agrees to conduct its Work with as little disruption as reasonably possible to the College's students, faculty, employees and guests, and will maintain a safe environment for the College's students, faculty, employees and guests, in addition to the Contractor's employees and workers of all tiers. The Contractor and its Subcontractors and employees of all tiers must display courtesy and consideration with and shall refrain from discriminating against or harassing the College's students, faculty, employees, visitors and guests at all times. The Contractor will not allow smoking, vaping, alcohol, drugs, any firearms, or other weapons on the College's property at any time. The Contractor shall abide by all campus traffic regulations.

## **5.9 Submittals (Shop Drawings, Product Data, Samples).**

Prior to the beginning of Work on the Project, the Contractor shall furnish to the Architect and the College for their review and approval, a schedule setting forth all the submittals, including shop drawings, product data and samples required by the Contract Documents, that the Contractor intends to submit to the Architect for review and approval, the date upon which the Contractor shall make each such submittal and the date upon which the Architect shall complete its review of each such submittal, which in no event shall be less than ten (10) days from receipt (“Submittal Schedule”). The Architect and the College shall identify all submittals that will require more than ten (10) days to review and notify the Contractor of the required review period. The Contractor shall adjust the Submittal Schedule to accommodate the extended review period. The Architect shall endeavor to conduct its review and approval of all submittals in accordance with the Submittal Schedule. In the event that a submittal is made that is not set forth on the Submittal Schedule, the Architect shall review and return such submittal within ten (10) working days from receipt.

Submittals shall be complete as to quantities, details, dimensions and design criteria. The Architect will approve and the College will review submittals if they conform to the Contract Documents, the design concept and good industry practice. The Contractor shall note its approval of all submittals and the date for any submittals prepared by any Subcontractor or supplier, and it shall be responsible for determining and verifying all materials, field dimensions, field construction criteria, and coordination requirements pertaining to the submittal.

The Contractor will not be relieved of responsibility of deviations in submittals from the requirements in the Contract Documents by reason of approvals of the submittals unless the Contractor specifically identifies the deviation in the submittal and the Architect and the College expressly approve the deviation in writing. The Contractor shall be responsible for errors or omission in its submittals. No Work or materials included in a submittal shall begin until the submittal is approved by the Architect and the College.

## **5.10 Layout And Dimensional Control.**

The Contractor shall be responsible for locating and laying out the Project components and all of the Project parts on the Project site in strict accordance with the Plans, and shall accurately establish and maintain dimensional control. The Contractor shall employ a competent and licensed New Jersey engineer or land surveyor as appropriate to perform all layout Work and to fix the level and location of excavations, footing base plates, columns, walls, floors and roof lines. The Contractor shall furnish to the College and the Architect certifications that each such level is as required by the Plans as the Work progresses.

The plumb lines of vertical surfaces shall be tested and certified by the Contractor's engineer or surveyor as the Work proceeds. The engineer or surveyor shall establish all points, lines, elevations, grades and bench marks for the proper control and execution of the Work. The engineer or surveyor shall establish a single permanent benchmark to be approved by the Architect, to which all three coordinates of dimensional control can and shall be based. The engineer or surveyor shall verify all topographical and utility survey data, and all points, lines, elevations, grades and benchmarks furnished by the College.

Should any discrepancies be found between information in the Plans and the actual site or field conditions, the Contractor shall notify the Architect and the College in writing, and shall not proceed with any Work affected until it receives written instructions from the College.

The Contractor is required to provide a final “as built” survey from a New Jersey licensed/certified surveyor of the Project site showing all structures, elevations, grades and required information on the Project site and submit to the College in CADD format.

#### **5.11 Construction Access, Roads, Walks, And Parking.**

The Contractor shall construct and keep all roadways, drives, walkways and parking areas within or near the site free and clear of debris, gravel, mud or any other site materials, including, for example, the cleaning of muddy wheels and undercarriages on vehicles before they exit the site. The Contractor shall be responsible for any citations, fines, or penalties imposed on it or the College for failing to comply with applicable local rules or laws regarding its use of roads and the like.

The Contractor shall obtain permission in writing from the College before using for construction purposes any existing driveways, parking areas, walkways or areas not specifically designated for such use in the Contract Documents. The Contractor shall maintain such driveways and areas in good and clean condition during construction and not damage them. At Final Completion, the Contractor shall leave them in the same condition as they were at the start of the Work. Conditions of such facilities before use shall be photographed and otherwise documented by the Contractor. The Contractor shall not commence construction of permanent driveways, parking areas or walks on the Project site without the written approval of the College.

Any existing walkways, driveways, aprons, or curbs damaged by the Work of the Contract Documents shall be replaced in kind, at the Contractor’s expense, immediately upon Project completion, or as required to maintain campus safety and campus aesthetics.

#### **5.12 Construction Site Condition, Storage, Dust Control.**

The Contractor shall provide reasonable, safe and orderly storage for its equipment, tools and materials, and shall not unreasonably encumber the site. The Contractor shall keep the site and the Project free from the accumulation of refuse, debris and scrap materials caused by its operations so that the site has a neat, orderly and workman-like appearance. Loading, cartage, hauling and dumping will be at the Contractor’s expense. The Contractor shall provide, at its expense, temporary dust-proof partitions around areas of work in existing buildings, and where reasonably required, in new building areas.

#### **5.13 Photographs.**

The Contractor shall provide, at its expense, monthly progress photographs of the Project. The photographs shall be 8 inches by 10 inches and shall be submitted to the College in duplicate monthly. Unless otherwise specified in the supplemental general requirements, four photographs

shall be submitted each month which provide views of the Project taken from the same four points each, which points shall be selected by the Architect.

#### **5.14 Project Sign.**

The Contractor shall, at its expense, provide, erect and maintain two Project signs at the site, which shall be described in the Contract Documents. The College will specify the location of the signs. The signs shall be painted by a professional sign painter or prepared by a professional graphic artist. No other signage will be permitted at the site. The signs shall include the name and cell phone number of a Contractor-designated project lead that is available for 24-hour contact in case of emergency. The Contractor shall remove the signs when the Project is finally accepted unless the College requests that they be removed earlier.

#### **5.15 Soil Conservation.**

The Contractor shall employ reasonable measures to conserve the soil at the site, and determine and comply with all soil conservation measures required by the Mercer County Soil Conservation District.

The Contractor shall coordinate and schedule all soil conservation inspections, shall provide the College with written notice of all such inspections so that the College may attend the inspections if it chooses in its sole discretion to do so, and shall provide the College with all site inspection notes, approvals or notices.

#### **5.16 Temporary Facilities, Services, Electric, Heat And Enclosures.**

The Contractor shall provide storage areas, temporary drives and sidewalks, employee parking areas, staging areas, excavation borrow/spoil areas, commercial canteen areas, field offices including a meeting room, telephones, toilet facilities, and other temporary facilities that are necessary to perform the Work or that may be required by the Project Specifications. The Contractor shall locate these facilities on the Project site, and the location shall be subject to the approval of the College.

The Contractor shall provide adequate and clean temporary toilet facilities on the Project site in locations to be approved by the College, and they shall be serviced at least twice a week by a firm qualified and experienced in such functions. The Contractor shall provide such temporary electricity, water, and other utilities that are necessary to perform the Work, or that may be required by the Project Specifications. The Contractor shall also supply such temporary enclosures and heat that are necessary to perform the Work or that may be required by the Project Specifications. The Contractor and the Subcontractors will not enter or use any College facilities not required by the Work of the Contract.

Temporary electric and heat shall be furnished by the Contractor for the benefit of other contractors working on the Project if specified in the Project Specifications.



The Contractor shall not anticipate using the permanent heating or air conditioning system in a building for temporary heat or air conditioning prior to the acceptance of the Project as Substantially Complete unless specified otherwise.

Any natural gas, combustible material, or hazardous material containers utilized by the Contractor must be stored in a safe, ventilated location approved by the College. The Contractor must also submit for approval a reasonable safety plan for the operation of temporary heat equipment. The Contractor shall be solely responsible for any natural gas, combustible material or hazardous materials containers utilized by the Contractor or any of its Subcontractors and shall indemnify, defend and hold harmless the College from any fines, costs, expenses, liabilities, damages, etc. resulting from the Contractor's or any of its Subcontractors' use of such materials.

### **5.17 Substitutions.**

To the extent that the Contractor includes in its bid substitute materials or equipment or construction methods in lieu of those specified in the Contract Documents, it does so at its own risk. Any substitution must be equal in type, function and quality to the item required in the Contract. The Contractor must submit all information required within 20 days of the Contract award to determine if the proposed substitute is equal to the requirements of the Contract Documents, and any substitution must be approved in writing by the Architect and the College.

The College shall have complete discretion to decide whether it will accept any substitution. No substitution shall result in any increase in the Contract Price or Contract Times. The Contractor in its application for the substitution must certify in writing that the substitution is equal to what is specified in the Contract Documents in all material respects and will not increase the Contract Times or Contract Price of the Work.

Should the substitution be rejected, the Contractor will then be required to provide the specified product, material or method at no additional cost to the College and no change in the Project Schedule.

### **5.18 License Fees.**

The Contractor shall be responsible for obtaining the right to use any equipment, design, device or material required to perform the Contract, and shall include in its Contract Price any license fee or royalty required.

## **ARTICLE 6** **SUBCONTRACTORS**

### **6.1 The Contractor's Responsibility For Subcontracted Work.**

The Contractor shall be fully responsible to the College for the proper performance of the Contract irrespective of whether the Work is performed by the Contractor's own forces or by Subcontractors employed by the Contractor. The Contractor shall be responsible for the acts and

omissions of its Subcontractors and suppliers on the Project and shall take appropriate measures if they are not properly supervising or performing their Work.

## **6.2 Subcontractor Identification And Approval.**

The Contractor shall have included with its bid for the Contract, the names, addresses and license numbers of all Subcontractors that it proposes to utilize on the Project for plumbing and gas fitting work, HVAC work, electrical work, structural steel and ornamental iron work. No Subcontractor may perform Work on the Project until it has been approved in writing by the College.

Within 20 days after issuance of the Notice to Proceed, the Contractor shall furnish to the Architect and the College in writing for review by the Architect and the College a list of the names of all Subcontractors, sub-subcontractors, fabricators, manufacturers, sources of supply, articles, devices, fixtures, pieces of equipment, materials and processes proposed for each item of Work using AIA Document G705-2001, List of Subcontractors. The Architect and the College will notify the Contractor in writing if either the College or the Architect, after due investigation, has reasonable objection to any names on such list.

In submitting the names of Subcontractors, the Contractor shall (1) list the name and address of the Subcontractor, (2) provide the name and address of all sub-subcontractors for each significant subdivision of the trade or work, and (3) reference in the form of a list at least 3 jobs similar in size and quality to the Project performed by the subcontractor in the last 5 years, with name and location of work, dollar value and names of the College and the Architect.

In submitting sources of supply, articles, devices, fixtures, piece of equipment and materials, including those under subcontracts and sub-subcontracts, the Contractor shall list (1) the name and address of the source of supply, and (2) the name of the manufacturer of the items.

If the College disapproves of a proposed Subcontractor, it will provide the reason for its decision in writing. The College will not be liable for any extra cost or delays caused by the reasonable disapproval of proposed Subcontractors. The approval of Subcontractors by the College shall not relieve the Contractor of the responsibility for complying with all of the provisions of the Contract Documents including those performed by the Subcontractors. Subcontractors approved by the College may not be changed without prior notice to and written approval by the College.

Payment to the Contractor shall not be made until the list of Subcontractors (as required above) has been provided to the Architect and College.

## **6.3 Subcontractor Qualifications.**

The College may disapprove of a proposed Subcontractor if (i) it has a reasonable objection to the Subcontractor, (ii) there is evidence of poor performance on other Projects or financial problems, (iii) the Subcontractor has been suspended or debarred by any public agency within the State of New Jersey, (iv) the Subcontractor is not properly licensed and registered to do business in New Jersey or with the New Jersey Department of Labor regarding prevailing

wages, or (v) the Subcontractor has been charged with or convicted of violating any laws, including but not limited to, the New Jersey Prevailing Wage Act, criminal laws, public procurement laws, anti-trust laws, election laws, laws against employment discrimination, environmental laws, tax laws, professional licensing laws, or laws regarding attempts to improperly influence the College or other public officials.

Subcontractors shall utilize qualified, competent craftsmen on the Project.

#### **6.4 Subcontractor Compliance With Contract/Subcontractor Supervisors.**

The Contractor shall require its Subcontractors on the Project to comply with all pertinent terms of the Contract Documents, and shall include all appropriate terms and provisions in written subcontracts on the Project to achieve proper Contract performance. Each Subcontractor shall have competent superintendents and foremen supervising their work, and the Contractor shall take appropriate measures if they fail to do so.

#### **6.5 No Contractual Relationship Between The College And Subcontractors.**

The Contractor shall enter into written subcontracts with each and every Subcontractor and supplier solely in its own name. No approval by the College of any Subcontractor or supplier and nothing in the Contract Documents shall create any contractual relationship or duties between the Contractor's Subcontractors and the College. Nothing in the Contract Documents shall cause any of the Contractor's Subcontractors or suppliers to be deemed a third-party beneficiary of the Contract between the College and the Contractor, and nothing herein shall give any of the Contractor's Subcontractors or suppliers any rights or claims directly against the College.

#### **6.6 Contingent Assignment of Subcontracts.**

Each subcontract agreement for a portion of the Work and any purchase order for materials or equipment may, in the College's sole discretion, be assigned by the Contractor to the College, provided that

- (a) assignment is effective only after termination of the Contract by the College for cause or for convenience and only for those subcontract agreements that the College accepts by notifying the Subcontractor and the Contractor in writing and only on such terms and conditions acceptable to the College;
- (b) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract;
- (c) if the College elects to take an assignment of any subcontract or purchase order, the Contractor shall execute all papers necessary to effectuate the assignment; and
- (d) the assignment shall not relieve the Contractor of its existing obligations to any Subcontractor or Supplier, nor shall it cause the College to assume

any of the Contractor's obligations to any Subcontractor or Supplier that arose prior to the termination.

When the College accepts the assignment of a subcontract agreement or purchase order, the College assumes the Contractor's rights and obligations under the subcontract going forward. Upon such assignment to the College, the College may further assign the subcontract to a successor contractor or other entity.

**ARTICLE 7**  
**TIME, LIQUIDATED DAMAGES, DELAY CLAIMS AGAINST THE COLLEGE.**

**7.1 Contract Times.**

The Contractor shall begin the Work within 10 days after the issuance of a Notice to Proceed by the College, and shall perform the Work in the Contract Documents by the dates specified in the Notice to Proceed, including Construction Start, Milestone, Substantial Completion and Final Completion Dates (collectively, "Contract Times"). As specified in the Contract for Construction, if the Work is to be performed in phases, the College may issue separate Notices to Proceed for each phase, which shall specify the Construction Start, Milestone, Substantial Completion and Final Completion Dates for that phase. The College may, in its sole discretion and at no cost to the College, choose to delay the issuance of a Notice to Proceed and the Construction Start Date for any phase until after the Contractor has achieved Substantial or Final Completion of any other phase.

**7.2 Liquidated Damages For Delay.**

If the Contractor fails to Substantially Complete any phase of the Work or the entire Work by the Substantial Completion Date(s) set forth in the applicable Notice to Proceed (as extended by Change Order, if applicable), and the delay is not excused by the College, then the Contractor shall pay the College the amounts specified in the Contract for Construction as liquidated damages for delay for each calendar day that the phase of the Work or the entire Work is not Substantially Completed beyond the applicable Substantial Completion Date

**7.3 Delay Claims By The Contractor Against The College --  
Limitations.**

The Contractor may not assert claims against the College for extra compensation by reason of any delays in its Work resulting from acts or omissions of any third parties irrespective of extensions granted under the Contract, including but not limited to delays caused by third parties such as the Architect, other contractors, utilities and governmental authorities.

The College shall only be required to pay additional compensation for delays caused by the College itself, and only to the extent required by N.J.S.A. 2A:58B-3 (delayed performance caused by the College's own negligence, bad faith, active interference or other tortious conduct, but not for reasons contemplated by the parties and not for the negligence of others including

others under contract with the College on the theory that such negligence should be imputed to the College). The College shall not be liable for any period of delay when there is a concurrent delay for which the College is not responsible.

When the Contractor is entitled to extra compensation for delay under the Contract for Construction and these General Conditions, it can only assert claims for extra costs at the job site, and may not assert claims for extra costs for home office expenses, home office overhead, lost profit or revenue, or consequential losses as that term is defined by New Jersey law. Any additional compensation under this Article shall also be subject to the provisions in the Contract for Construction and these General Conditions regarding claims, and the provisions in the Contract for Construction and these General Conditions regarding the maintenance and availability of cost records.

## **ARTICLE 8** **PROJECT SCHEDULE**

### **8.1 General Project Schedule Requirements.**

The Contractor shall schedule the construction Work and determine the most feasible means and order for the Work to complete the Project within the times required by the Contract. The Contractor shall prepare a Project Schedule and monthly schedule updates, which must be approved in writing by the College and the Architect. The Contractor shall perform the Contract and the Work in accordance with the Project Schedule. The Project Schedule should include a schedule of submittals for approval as required herein. The Project Schedule must be submitted before any Work (other than mobilization to site and general layout and site preparatory work) on the Project can begin under the Notice to Proceed. When the Contractor's Project Schedule is approved in writing by the College, it shall become an additional Contract Document and the Contractor shall be required by the Contract to comply with it. The Project Schedule and any updates to it shall be used in determining the amount of the monthly progress payments to the Contractor. The College may also use the Project Schedule and updates to determine if the Contractor is adequately planning and performing the Work in accordance with the Contract Documents.

### **8.2 Form And Content Of Project Schedule.**

The Contractor shall prepare the Project Schedule using Critical Path Method (CPM) scheduling techniques. The Contractor shall utilize the latest revision of Primavera P3 or Microsoft Scheduling software. The Contractor shall prepare a detailed schedule which shows how it will plan, organize, execute and complete the Work. The Project Schedule shall be in the form of an activity oriented network diagram (CPM). The principles and definitions used in this Article shall be as set forth in the Associated General Contractors of America (AGC) publication "Construction Planning and Scheduling", copyright 1994.

The detailed network diagram shall provide sufficient detail and clarity of form and technique so that the Contractor can plan, schedule and control the Work properly, and the College and the Architect can readily monitor and follow the progress of all portions of the

Work. The network diagram shall comply with the limitations imposed by the scope of the Work and contractually specified Milestone, Substantial Completion, and Final Completion Dates. The Project Schedule shall include the arrow or network diagram and the computer produced schedule with dates. The Project Schedule shall include and reflect the following factors:

- (a) Project phasing, contract Milestone, Substantial and Final Completion Dates.
- (b) The structural breakdown of the Project.
- (c) The types of Work to be performed and the labor trades involved.
- (d) Reasonable logic and activity durations.
- (e) Reasonable coordination of all activities.
- (f) Purchase, manufacture and delivery activities for all major materials and equipment.
- (g) Deliveries of equipment furnished by the College.
- (h) Allowances for work by separate contractors identified in writing by the College at the time of Contract award.
- (i) Submittals and approvals of shop drawings, material samples, and other required submittals.
- (j) Subcontract Work.
- (k) Crew flows and sizes (manpower).
- (l) Assignment of responsibility for performing all activities.
- (m) Access and availability to Work areas.
- (n) Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, and sequences and interdependence of activities.
- (o) Testing and inspections.
- (p) Phased or total inspection, acceptance, and takeover by the College.
- (q) Utilization of the Project Schedule to determine amounts of monthly progress payments.
- (r) Activities required of the College and the Architect such as approvals, including reasonable durations for the activities.

Activities should be set forth in working days and have a maximum duration of 60 days, except for non-construction activities such as the procurement and delivery of materials and equipment. All durations shall be the result of definitive manpower and resource planning by the Contractor. The level of detail in the Project Schedule shall be subject to the approval of the College. The Project Schedule shall include a reasonable approach to achieve Milestone, Substantial Completion and Final Completion Dates in the Contract. Any failure of the Contractor to include any element of the Work in the Project Schedule shall not excuse the Contractor from completing that Work and all of the Work needed to complete the Project by the Milestone, Substantial Completion and Final Completion Dates in the Contract.

The network diagram is to be prepared by a computer plotter. The logic diagram will be pure logic and shall not be drawn to time scale. The logic diagram shall be drawn on 30" x 42" size sheets and prepared on a tracing/mylar or similar material suitable for reproducing high quality prints.

### **8.3 Computerization Of Project Schedule.**

The mathematical analysis of the detailed network diagram shall be made by computer, and the tabulation for each activity shall include the following:

- (a) Activity numbers.
- (b) Activity descriptions.
- (c) Durations in work days for each activity.
- (d) Earliest start date (by calendar date).
- (e) Earliest finish date (by calendar date).
- (f) Latest start date (by calendar date).
- (g) Latest finish date (by calendar date).
- (h) Slack or total float in work days.

The following computer documents shall be prepared as part of the initial Project Schedule submission and each update:

- (a) Activity file sort, including sorts listing activities required of the College and the Architect, such as approvals.
- (b) Eight week "lookahead" detailed bar chart.
- (c) Eight week summary bar chart.
- (d) Additional computer sorts requested by the College.
- (e) High density CDs or thumb drives of all computer files.

### **8.4 Weather Inclusion In Project Schedule.**

Seasonal weather conditions shall be included in the Project Schedule, including average precipitation, temperature and other weather conditions typical in the geographic area over a 5 year period by month.

### **8.5 Project Schedule Updates.**

The Contractor shall prepare Project Schedule updates monthly until the Project is completed. The first update shall be issued 30 calendar days after the Construction Start Date specified in the Notice to Proceed. Updates shall include the following information:

- (a) Actual start and completion dates for activities.
- (b) Activity percent completion.
- (c) Remaining durations for activities in progress.

Each Project Schedule update shall also include a narrative report that includes the following information:

- (a) Summary of Work completed during update period.
- (b) Comparison of actual progress and status to activities and dates in original Project Schedule.

- (c) Analysis of critical path including effect of activity progress on the Project critical path.
- (d) Analysis of secondary critical paths, meaning float within 10 days of the Project critical path.
- (e) Analysis of time lost or gained during the update period.
- (f) Identification of problem areas.
- (g) Identification of change orders and delays impacting or delaying the Project under the Project Schedule.
- (h) Solutions or proposed solutions to current problems and delays.
- (i) Extensions requested by the Contractor, including activities affected and the amounts, and the reasons for the requests.
- (j) Extensions granted by the College for delays and changes, including the activities affected and the amounts, and any effect on the critical path and Contract Milestone, Substantial Completion and Final Completion Dates.
- (k) Delays in activities required of the College and the Architect, and activities that they are required to complete in the update period following the issuance of the update.

All Project Schedule updates must be submitted to the College and the Architect for written approval. Project Schedule updates, including the reports which are approved by the College, shall be deemed to be official records of the progress and status of the Project under the Project Schedule and the Contract, and may be utilized by the College in determining if the Contractor is adequately planning and performing the Work under the Contract Documents.

#### **8.6 Meetings/Eight Week Bar Charts.**

The Contractor's Project Manager and Scheduler shall arrange for and attend monthly progress and scheduling meetings with the College and the Architect. Monthly progress meetings shall be scheduled 3 to 7 days after monthly Project Schedule updates and reports are issued and provided to the College and the Architect. The purpose of these meetings will be to review past progress, current status, problem areas, delays, measures to reduce delays, future progress, and the Contractor's most recent Project Schedule update and report. At the monthly progress meetings, the Contractor shall provide a look ahead summary and detailed bar charts showing the Work and activities to be performed and/or completed during the 8 week period following the Project Schedule update.

#### **8.7 Project Schedule Documentation For Contract Payments.**

The Contractor will not be entitled to payments under the Contract until a Project Schedule has been submitted to and approved in writing by the College. No payment will be made under the Contract if, when the payment is due, a Project Schedule update and narrative report is due under this Article but has not been submitted to and approved in writing by the College. The original Project Schedule shall include a breakdown allocating the total Contract Price among the network activities in the Project Schedule, which must be approved by the College.



### **8.8 Progress and Recovery Project Schedules.**

The Contractor shall perform its Work in accordance with the Project Schedule. If the Contractor's Work falls behind the requirements of the Project Schedule, it shall, at its own cost, institute measures to improve its progress and bring its Work in compliance with the Project Schedule, including but not limited to increasing manpower, increasing work hours per shift, increasing shifts, increasing working days per week, and rescheduling Work activities to perform them concurrently where feasible.

If monthly Project Schedule updates show that the Contractor's progress has fallen behind the Project Schedule so as to jeopardize the achievement of Milestone, Substantial Completion or Final Completion Dates by more than 10 work days, the Contractor shall, if requested by the College in writing, prepare a recovery schedule with acceleration measures to regain the lost time, and shall proceed in accordance with the recovery schedule in addition to the Project Schedule at its own cost.

### **8.9 The Contractor's Failure to Provide Project Schedule Updates.**

If the Contractor fails to provide monthly Project Schedule updates and reports when required, the College can elect in its sole discretion to employ any of the following remedies: (i) not make progress payments; (ii) on 10 days written notice to the Contractor, retain its own consultant to provide Project Schedule updates and reports and deduct the cost from the Contract Price; (iii) terminate the Contract for default in accordance with the termination provisions in the Contract for Construction and these General Conditions and/or (iv) make a claim on the performance bond.

### **8.10 Scheduler Qualifications.**

The Contractor must utilize a Project Scheduler that satisfies the qualification requirements for the Project. If at any time during the Project it appears that the Contractor's Project Scheduler is not competent to provide the scheduling services required in this Article, the Contractor shall, within 10 days after a written notice and demand from the College, retain a replacement scheduler that is competent to provide the services required. The College may also utilize any of the remedies provided in the Contract for Construction or these General Conditions for the Contractor's failure to provide proper Project Schedule updates and reports.

## **ARTICLE 9** **EXTENSIONS, COMPENSATION FOR CERTAIN EXTENSIONS.**

### **9.1 Delays Warranting Extensions Of Contract Times.**

If the Contractor is unavoidably prevented from completing any part of the Work within the Milestone, Substantial Completion or Final Completion Dates by causes beyond the control and without the fault of the Contractor or its Subcontractors, those Contract Times will be extended by amounts equal to the time lost due to such delays, provided the Contractor requests extensions in accordance with this Article. Delays warranting extensions of the Contract Times

include unforeseeable and unavoidable delays caused by the College, the Architect, other contractors employed by the College, utility owners or other third parties, acts of God, acts of governmental authorities, wars, abnormally severe weather conditions of unusual duration (specifically excluding weather conditions of the type and duration that have been encountered in the area in which the Project is located) that prevent timely delivery of materials or equipment necessary to the completion of portions of the Work or hamper access to the Work by workmen or Subcontractors, fires, floods, earthquakes, epidemics, plagues, and other unavoidable casualties.

Apart from an extension of time, no payment or allowance of any kind shall be made to the Contractor as compensation for damages on account of hindrance or delay from any cause in the progress of the Work, whether such delay be avoidable or unavoidable. The Contractor agrees that it will make no claim for compensation, damages for any such delays, and will accept in full satisfaction for such delays said extension of time.

### **9.2 Weather Delays.**

The Project Schedule shall take into account normally anticipatable adverse weather plus an additional five (5) days of severe and unusual weather conditions that will materially interfere with the timely prosecution of the Work. No time extensions will be granted for time lost due to weather conditions that do not meet the criteria set forth in Article 9.1, and then only to the extent more than five (5) days of delay result from such severe and unusual weather conditions. Owner shall not be required to keep a record of days of precipitation or low temperatures and the burden of proof with respect to weather delays shall be upon Contractor. No time extensions will be considered for any weather conditions that do not affect Work on the critical path or Contract Times.

### **9.3 Float Time Use.**

Float time in the Project Schedule is not for the exclusive use of either the Contractor or the College. Float time is available for use by both parties to facilitate the effective use of available resources and to minimize the impact of problems and delays that may arise during construction. No time extension will be granted as a result of any problem, change order or delay which only results in the loss of available positive float on the Project Schedule. Float time shown on the Project Schedule shall not be used by the Contractor in a manner that is detrimental to the interests of the College or the Project.

### **9.4 Calculation Of Extensions.**

Extensions will be calculated based on the effect of delays on the Project Schedule and the activities in the Project Schedule. If the Contractor is entitled to an extension for a delay based on the nature of the delay under this Article, the activities in the Project Schedule affected by the delay will be extended by the amount they are affected. If extensions of activities in the Project Schedule affect the critical path and delay the Contract Milestone, Substantial Completion or Final Completion Dates, they too will be extended to the extent affected. The critical path and Contract Times will only be extended to the extent that they are actually

affected under the Project Schedule by a delay for which the Contractor is entitled to an extension.

If, for any scheduled activity or period, there are concurrent delays that include delays for which the Contractor is entitled to an extension and delays for which the Contractor is not entitled to an extension, the Contractor will be given an extension for the delays for which it is entitled to extension so that it will not be liable to pay liquidated damages for delay, unless the College eliminates or reduces that delay. A concurrent delay will not justify an extension to the Contractor if it has minimal effect on the completion of the Project, and/or if it would likely have been avoided if it had become apparent that it was having an effect on the progress of the Project and the Final Completion Date.

#### **9.5 Elimination of Delays and Extensions (Acceleration).**

If the effect of a delay for which the Contractor is entitled to an extension can be reduced or eliminated by changes in the Project Schedule or other measures which have no material adverse impact on the Contractor in terms of cost or otherwise, the Contractor shall employ those measures so that no extension is required or so that a shorter extension is required. If the Contractor is entitled to extensions for delays, and if the College (in its sole discretion) notifies the Contractor in writing that it prefers to eliminate the lost time to avoid or reduce the extension required, by changes or additional efforts such as acceleration efforts, the Contractor shall perform those measures as a change to the Contract to be compensated under the change order provisions in the Contract for Construction and these General Conditions.

#### **9.6 Requests For Extensions Required.**

The Contractor must provide the College with a written notice of delay and request for an extension within 24 hours of the beginning of a delay. The written notice of delay and request for extension must include the nature and cause of the delay, the known extent of the delay, the Work activities on the Project Schedule affected by the delay, and the extent of the effect to each, and suggestions or proposals to reduce or eliminate the delay. This limited time frame is to provide the College the opportunity to immediately address the issue and limit the amount of time in the potential delay and its potential impact on the Project Schedule.

#### **9.7 Compensation For Certain Extensions And Limitations.**

Under the Contract for Construction and these General Conditions, the College does not assume responsibility for many types of delays, including additional costs resulting from extensions granted because of those delays. Where the College is responsible for a delay under the express terms of the Contract for Construction and these General Conditions, it will pay extra compensation for any extension granted because of the delay.

Compensation by the College for delays (and extensions) for which it is responsible under the Contract for Construction and these General Conditions shall only include additional costs actually incurred at the site, and shall not include home office expense, home office overhead, lost profit or consequential losses. Any additional compensation under this Article shall be subject to the provisions in the Contract for Construction and these General Conditions

regarding claims, and the provisions in the Contract for Construction and these General Conditions regarding the maintenance and availability of cost records.

No compensation will be paid if an extension for a delay for which the College is responsible is concurrent with another delay for which the Contractor is not entitled to an extension, or is concurrent with another delay for which the Contractor is entitled to an extension but the College is not responsible for the other delay.

If the College requests a change in the Contract Work, potential delays and extensions that result from the change and any resulting extra compensation for the change shall be addressed under the change order provisions in the Contract for Construction and these General Conditions in addition to this Article.

## **ARTICLE 10** **PAYMENTS TO THE CONTRACTOR.**

### **10.1 Contract Price.**

The College will pay the Contractor as full compensation for performing the Work the Contract Price as adjusted by approved change orders that increase or decrease the Contract Price. The College will do so in accordance with this Article, any supplemental General Conditions regarding payment, and the payment terms in the Contract for Construction. Payment provisions in the supplemental General Conditions that add to or modify this Article shall take precedence over this Article. Payment provisions in the Contract for Construction that add to or modify payment terms shall take precedence over the supplemental General Conditions and this Article.

### **10.2 Monthly Progress Payments.**

The College will pay the Contractor monthly progress payments as the Work proceeds and will pay for the Work completed, less retainage. The Contractor shall submit monthly invoices using the College's invoice form for the Work completed in each calendar month, and the monthly invoice shall be submitted in accordance with the Contract. The Contractor shall be entitled to monthly progress payments based on the percentage of the Work completed (less earlier payments), and that amount shall be based on the Unit Schedule Breakdown and the update of the Project Schedule for the billing period showing schedule activities completed and progress on incomplete activities, in conjunction with the values assigned to those activities. If there is a discrepancy between the amount due based on the Unit Schedule Breakdown and the amount due based on the Project Schedule update, the Contractor shall only be entitled to the lesser amount unless the College's Representative, in his/her sole discretion, decides otherwise. Payments made by the College shall be used by the Contractor solely for purposes of this Project and for paying Subcontractors, suppliers, and for labor and materials, and shall not be used to pay debts owed by the Contractor outside of the Project.

### **10.3 Unit Schedule Breakdown/CPM Activity Price Breakdown.**

Before the Contract for Construction is signed, the Contractor shall submit to the College and the Architect a Unit Schedule Breakdown (schedule of values) utilizing the College's form (AIA Documents G702/G703) which reasonably allocates the Contract Price among the principal categories of Work and materials in the Contract. The Unit Schedule Breakdown must be signed by the Contractor and is subject to written approval by the Architect and the College for use in calculating monthly progress payments under the Contract. The Contractor shall not "front end load" the Unit Schedule Breakdown. The Unit Schedule Breakdown may include line items for mobilization, bonds and insurance.

The Contractor's proposed Project Schedule shall reasonably allocate the Contract Price among the activities in the schedule so that monthly Project Schedule updates can be utilized in connection with the Unit Schedule Breakdown in determining the amount of monthly progress payments. The Contractor's Unit Schedule Breakdown and Project Schedule activity price breakdown must be approved in writing by the Architect and the College before any payments are made under the Contract.

### **10.4 Invoices For Monthly Progress Payments: Form and Content.**

The Contractor must utilize the College's invoice form and the invoice forms (AIA Documents G702/G703 and waiver attachments) must be completed before they are submitted for payment. Each invoice must be signed by the Contractor, and shall certify that the Work and materials represented as having been provided have been provided, and that all Subcontractors and suppliers on the Project have been paid all amounts legitimately due for Work and materials billed to the College in earlier invoices that were paid by the College. The Contractor's submission of an invoice constitutes an affirmative representation and warranty by the Contractor that it performed the Work in compliance with the Contract Documents and applicable laws, codes and regulations.

Invoices for monthly Project payments must include the status of the Work in the Unit Schedule Breakdown and the Project Schedule update for the billing period that shows the activities completed or started and the value of them based on the Project Schedule. Invoices must also include certified payrolls for the Contractor and all Subcontractors for the billing period, affirmative action monthly manning reports, a certification of Subcontractor/supplier payments, the College's acknowledgment of progress payment and release of liens and claims form duly executed by the Contractor, the College's acknowledgment of progress payment and release of liens and claims form duly executed by each Subcontractor and supplier who has furnished labor or materials that are the subject of the current invoice, a list of all materials stored to date including descriptions, values, quantities and location, and any other documents required in the Contract Documents.

The Contractor will be entitled to have an invoice paid if the Architect and the College approve in writing the invoice including the percentage of Work completed, and if the quality of the Work and materials conform to the Contract Documents. The approval of invoices shall not waive claims for defects or deficiencies in the Work or materials provided, or the right to subsequently inspect the Project as a complete and functioning whole.

## **10.5 Payment For Materials And Equipment Procured But Not Installed.**

The Contractor may seek payment in monthly invoices for materials and equipment delivered to the Project site but not yet incorporated into the Work. The Contractor shall include with its monthly invoices a list of the stored equipment, the amount and type of stored materials, and the place where they are stored. Each invoice that seeks payment for materials and equipment delivered to the Project site but not installed or incorporated into the Work shall include a signed bill of sale to the College and an invoice from the supplier. All risk of loss or damage for materials and equipment delivered to the Project site shall remain with the Contractor.

The College will only rarely pay for material or equipment stored offsite, and only when it determines, in its sole discretion, that there is good cause. The College will consider no request to pay for materials or equipment stored off site unless the Contractor includes a written request for such payment with its bid for the Project. If the College does agree to pay for material or equipment stored offsite during the performance of the Contract, it will do so when the Contract for Construction is signed.

If the College does agree to pay for materials and equipment stored offsite, such payments shall be subject to any conditions in the signed Contract, and in all cases, a bill of sale to the College, a paid invoice, insurance and proof the storage facility is bonded will have to be provided to the College when each payment is sought. The location will have to be specified in writing and the material or equipment will have to be inspected by the College. The Contractor and its performance bond surety must agree in writing that they retain all risk of loss or damage, and each payment application must contain a consent to payments for materials stored offsite signed by the Contractor's bonding company.

Payments on account of materials or equipment not incorporated into the Work but delivered and suitably stored at the site, or at some other location agreed upon in writing, may be made by the College subject to the following conditions:

- (a) Such materials or equipment shall have been fabricated or assembled specifically for the Project and delivered to storage no earlier than needed for the orderly progress of the Work as demonstrated by the Project Schedule.
- (b) Title to such materials or equipment shall pass to the College pursuant to the Contractor's bill of sale, which shall contain guarantee of replacement thereof in the event of damage thereto or disappearance thereof due to any cause. The Contractor shall also affirm that it will pay for such materials or equipment immediately upon receipt of payment therefore from the College.

In the case of offsite storage, the Contractor shall also provide Consent of Surety to such payment and insurance of such materials or equipment against the perils set forth in these General Conditions both while storage and during transportation to the site. Raw materials or other materials or equipment readily duplicated or usable on other projects will be paid for only

after the materials are incorporated into the construction.

#### **10.6 Retainage.**

The College will retain 2% of the amount due on each partial payment pending Final Completion of the Contract.

Retainage amounts being withheld by the College shall be released and paid in full to the Contractor within 45 days of the Final Completion Date agreed upon by the Contractor and the College, without further withholding of any amounts for any purpose whatsoever, provided that the Work has been Finally Completed as indicated.

#### **10.7 Payment For Change Order Work.**

The Contractor shall invoice for change order work in the monthly progress payment invoices as the change order work is performed, but may only do so after a written change order has been signed by the appropriate College personnel and a TCNJ Purchase Order is issued by the College.

#### **10.8 Final Payment.**

Upon Final Completion of all the Work including all change orders, upon final acceptance of the Work by the Architect and the College, and upon the issuance of the Certificate of Final Completion, the Contractor will be paid the fully adjusted Contract Price including any retainage. The Contractor shall submit an invoice for the final payment. The final invoice must be accompanied by the College's acceptance of final payment and release of liens and claims form duly executed by the Contractor, the College's acceptance of final payment and release of liens and claims form duly executed by each Subcontractor and supplier who has furnished labor or materials that are the subject of the final invoice, all warranties, guarantees, manufacturer literature, approved as-built drawings, shop drawings required, and any other documents that the Contractor is required by the Contract Documents to provide to the College at the time of Final Completion. The final invoice must also include a written signed consent to the final payment signed by the Contractor's bonding company.

#### **10.9 Payment Terms.**

All invoices and payments shall be subject to the terms of the Contract for Construction and these General Conditions, including the provisions regarding payments, and to the right of the College to withhold payments or to make deductions from payments for damages, defective work, liquidated damages, third-party claims, failure to complete Work, failure to comply with requirements of the Contract Documents, failure to comply with Prevailing Wage Act requirements set forth in the Contract for Construction and these General Conditions, failure to comply with Project Schedule obligations, or other causes authorized by the Contract Documents.

### **10.10 Payment Based On Partial Acceptance (Limitation).**

The College will not accept portions of the Project as Substantially or Finally Complete unless specified elsewhere in the Contract Documents. If the Specifications authorize partial acceptances, they will also specify the terms and conditions of such acceptances.

### **10.11 Failure To Pay Amounts In Dispute Not To Affect Performance.**

The failure of the College to pay any amount requested by the Contractor in an invoice based on a determination that the invoice is improper or some other dispute shall not entitle the Contractor to stop or slow down the performance of the Work.

### **10.12 Reasons For Withholding Payment.**

In addition to the reasons set forth elsewhere in the Contract for Construction and these General Conditions, the Architect or the College may also withhold payments to the Contractor, or, because of subsequently discovered evidence, may nullify the whole or a part of a payments previously issued to the Contractor, to such extent as may be necessary in the Architect's or the College's opinion to protect the College from loss for which the Contractor is responsible because of

- (a) defective Work not remedied;
- (b) third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the College is provided by the Contractor;
- (c) failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- (d) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;
- (e) damage to the College or a separate contractor;
- (f) reasonable evidence that the Work will not be completed within the Contract Times, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- (g) failure to comply with requirements for monthly progress payments pursuant to Article 10.4; or
- (h) failure to carry out the Work in accordance with the Contract Documents.

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

If the College withholds or the Architect recommends that the College should withhold payment from the Contractor under subsection (c) above, the College may, after providing the Contractor with written notice and an opportunity to cure, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. However, by doing so, the College is not undertaking any payment obligation on the part of the



Contractor, nor does any Subcontractor have any claims against the College or any right to future joint check payments.

### **10.13 Set-Off For State Tax Indebtedness.**

Pursuant to N.J.S.A. 54:49-19, and notwithstanding any other provision of law to the contrary, if the Contractor or any of its Subcontractors or suppliers are indebted to the State of New Jersey for any State tax, the College may withhold and/or set off any payments due to the Contractor as may be necessary to satisfy such indebtedness and/or pending resolution of the indebtedness.

### **10.14 Maintenance Of Cost And Accounting Records.**

The Contractor shall maintain and retain weekly payroll, material, Subcontractor, supplier, overhead and other cost and accounting records for the Project, and for additional services or extras required by the College, including all costs that the Contractor is entitled to be paid under the Contract. The Contractor shall require its Subcontractors on the Project to do likewise. The Contractor shall also maintain all estimates and takeoffs used in preparing and calculating its bid price for the Contract and change orders. Pursuant to N.J.A.C. 17:44-2.2, the Contractor shall also maintain all documentation related to products, transactions or services under the Contract. The records shall be maintained and shall be made available to the College or its representatives when requested. These records shall be maintained in accordance with generally accepted accounting principles and practices for a period of 5 years after final payment is received by the Contractor, or the duration of any dispute or lawsuit arising out of the Project, whichever is later, and shall be made available to the College or its representatives and the New Jersey Office of the State Comptroller when requested.

Any failure to maintain or produce the records required by this Article shall preclude the Contractor from claiming or being paid or retaining any payments or being paid on any claims that are based on costs or that should be, and expenses or losses incurred by the Contractor or its Subcontractors including extra costs that are or that should be reflected in the records required by this Article or good business practices. This record keeping requirement applies to records related to the basic Contract Price as well as extra compensation for change orders and claims of all kinds.

No claim by the Contractor against the College for payment, whether for Contract Work, extras, changes or claims that is based to any degree on costs that should be recorded in cost records required by this Article or good business practices may be asserted against the College to the extent the cost records do not exist or are not provided to the College upon demand.

The College reserves the right to audit the records of the Contractor and its Subcontractors at any time and for up to 3 years after the Final Completion of the Project. If an audit reveals overpayment by the College, the Contractor shall refund the cost of the audit and the overpayment to the College, or the College may deduct the cost of the audit and the overpayment from future payments under the Contract, or the College may assert claims against the Contractor and/or its surety for the cost of the audit and such overpayments.

### **10.15 Written Evidence of Payment to Subcontractors.**

The College has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers' amounts paid by the College to the Contractor for subcontracted Work. Such evidence shall include acknowledgment of progress payment and release of liens and claims forms duly executed by each Subcontractor and supplier for payments previously made to the Contractor. If the Contractor fails to furnish the College with the written evidence that it has properly paid Subcontractors and material and equipment suppliers, the College shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the College nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law. The College may, in its sole discretion, issue checks made payable jointly to the Contractor and a Subcontractor; however, by doing so, the College is not undertaking any obligation on the part of the Contractor, nor does the Subcontractor have any claims against the College nor any right to future joint check payments.

## **ARTICLE 11** **CHANGES.**

### **11.1 Changes Authorized.**

The College may at any time authorize and direct changes in the Work or accelerations of the Work that change the scope of the Work and that increase or decrease the Contract Price. All changes including changes in the Contract Price shall be governed by this Article. All changes must be in a written change order signed by the Vice President for Administration, the College's Representative, the Architect and the Contractor. A TCNJ Purchase Order will then be issued by the College and signed by the Contracting Officer, after which time, the Contractor can then bill for the completed change order Work. Any extensions in the Contract Times and increases in the Contract Price because of extensions resulting from changes shall be governed by Article 9 of these General Conditions regarding extensions, but the authorization for the extra compensation itself resulting from an extension must be contained in a change order that complies with this Article as well. The College may elect to have changed Work on the Project that is within the scope of the Contract Documents performed by another contractor. Changes in the Work shall not affect the surety bond protection or insurance coverage required by the Contract Documents.

### **11.2 Change Request Or Directive.**

The College may request a change in the Work or materials to be provided under the Contract Documents by a written Contract Change Directive ("CCD") signed by the College's Representative. If the College is of the opinion that no change in the Contract Price or Contract Times is required because of the change request, it shall so state in the CCD. A CCD may include provisions regarding the scope of the changed Work or materials, and may also include conditions including time parameters. A CCD may provide that specified Work shall stop until further notice, but the Contractor shall not stop or delay any Work because of a CCD unless the CCD provides that Work should stop because of the change. A CCD may provide that the performance of changes shall not commence until a change order is issued and a subsequent

TCNJ Purchase Order is issued and signed by the Contracting Officer, or that changed Work should proceed before a change order and TCNJ Purchase Order are issued by the College to maintain the progress of the Project.

### **11.3 Change Orders Which Are Protested.**

If the Contractor protests the terms of a change order, it shall notify the College of its protest in writing within 2 business days of the issuance of the Change Order. It shall describe the terms that it objects to and the reasons for its protest. It shall include supporting documentation if appropriate, including detailed justification for any Contractor requested additional compensation based upon unavoidable additional costs. The College may elect to direct the Contractor in writing to perform the change order requirements despite the protest. If it does so, the Contractor's right to pursue further relief based on the protest shall be preserved and the Contractor shall immediately proceed with the change Work

### **11.4 Changes Affecting Contract Times.**

Changes and change orders shall not affect or extend any of the Contract Times unless the change order itself specifies that it changes Contract Times. If a change order issued by the College delays the completion of any activity in the Project Schedule, the time allowed for that activity shall be extended, and if a delay in that activity delays other activities, the critical path or the Completion Dates in the Contract, they too will be extended. The Contractor shall make reasonable efforts in scheduling changed Work so that it does not delay or extend activities in the Project Schedule critical path, including any Milestone Dates, the Substantial Completion Date and the Final Completion Date. The Contractor shall also make alternate proposals for change order Work that include acceleration for the changed Work where feasible to achieve this goal, and shall include the cost of such efforts in its change order requests and proposals.

Change orders must specify whether they result in any delay (or extension) to any critical path activities in the Project Schedule, including an identification of the activities and the amount of delay in each. If no delay or extension is set forth in a change order, it will be deemed an agreement by the College and the Contractor that no delay or extension results from the change order.

### **11.5 Contractor Initiated Change Order Requests.**

If the Contractor contends that any directive or communication from the College or Architect, or any condition, event or circumstance entitles it to a change order changing the scope of the Work, terms of the Contract Documents, Contract Price or Contract Times, it shall submit a written change order request to the College's Representative within 5 days of the event upon which the request is based. The written request shall specify the terms of the change order requested, and include all documentation and information that the Contractor seeks to have considered in support of the request, or that is necessary to a proper consideration of the request.

## **11.6 Change Order Amounts.**

All price changes or amounts in change orders shall be based on (i) lump sum, (ii) actual work time and materials plus mark-ups for overhead and profit, or (iii) unit prices times actual quantities that may or may not include separate mark-ups for overhead and profit. If a change order price is to be based on a lump sum price or a unit price, the College may request the submission of such documentation regarding market price or cost which it reasonably deems necessary to determine a lump sum or unit price. If a change order is based on actual work time and material costs, it will include a not-to-exceed price.

Applications for payment for change order Work shall be included in monthly progress payment invoices as the change order work is performed, but only after a TCNJ Purchase Order has been issued to the Contractor by the College. For change orders based on time and material costs or unit prices times actual quantities, the time spent, material provided, and quantities performed shall be recorded in daily time slips, material invoices, and quantity of work performed tickets that are signed by the College's Representative to certify that the Work and materials were provided, and the quantities. Labor costs and material costs for change orders shall be based on actual costs to the Contractor without any mark-ups except as provided in this Article.

Mark-ups may be added to time and material costs where a change order is authorized to be paid on a time and material basis, and also unit price change orders if the change order price term expressly authorizes mark-ups as a separate additional charge to be added to the unit price. When mark-ups for overhead and profit are authorized, the standard mark-up for overhead and profit shall be 15% of net costs properly invoiced in the change order. The schedule for mark ups is as follows:

- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Contractor;
- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor for the Contractor; and
- 15% of direct costs for overhead, profit, bond, and insurance for Work performed directly by the Subcontractor's subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor's subcontractor for the Subcontractor and 5% of the direct and indirect costs of the Work performed by the Subcontractor for the Contractor.

There shall be no additional mark-ups for materials or supplies. Bond and insurance costs are included in the noted mark ups above. Refer to Division 1 Specifications also for further delineation of items included in mark-ups.

**THE CONTRACTOR MUST USE THE COLLEGE'S CHANGE ORDER FORM INCLUDED IN THE PAYMENT PROCEDURE DOCUMENTS.**

### **11.7 Right To Audit Extra Costs (Before And After Payment).**

The College reserves the right to audit all change orders and additional costs claimed and/or paid under the Contract at any time. The obligation of the Contractor, Subcontractors and suppliers to establish, maintain and produce cost records and remedies for failing to do as specified elsewhere in these General Conditions and the Contract for Construction shall govern. If an audit reveals that actual costs invoiced to the College and/or paid by the College in change orders exceed the actual costs incurred, the Contractor shall refund the excess, or the College may deduct the excess from future payments under the Contract, or the College may assert claims against the Contractor and/or its surety for such overpayments.

### **11.8 Change Orders With Both Price Increases and Decreases.**

If a change order reduces the scope of the Work or materials to be provided by the Contractor under the Contract, the change order shall provide for a reduction in the Contract Price in the amount of the actual reduction in cost. If a change order results in both added costs and reduced costs, they shall be combined for a net plus or minus Contract Price adjustment, and when mark-ups are applicable, they shall only be added to a net increase in the Contract Price which results from a combination of additions and deductions in the change order.

### **11.9 Waiver Of Rights In Connection With Change Orders Issued Without Protest.**

The Contractor shall not be entitled to seek any additional compensation or any extension of the Contract Times beyond the amounts and any extensions included in a change order signed by the College or a written change order request submitted by the Contractor to the College for approval, the intent being that the Contractor must disclose all additional costs and delays claimed to result from a change so that the College can take measures in considering the change to effect cost savings and avoid delays. The failure to include extra costs or delays in a change order request will preclude the Contractor from later claiming such costs or delays in connection with the change in any form or fashion.

## **ARTICLE 12** **COMPLETION.**

### **12.1 Substantial Completion.**

When the Contractor believes that the Project (or a specific phase of the Work, if the Work is to be performed in phases) is Substantially Complete, meaning all essential requirements of the Work have been sufficiently completed so that the Project (or a specific phase) can be occupied and used for its intended purpose (and as further defined in the College's Division 1 specifications for capital projects), it can make a written request to the Architect and the College to conduct an inspection and to issue a Certificate of Substantial Completion. The Contractor's request shall list all Work and requirements of the Contract Documents that remain to be completed or corrected and an estimate of the value of the incomplete items and the dates by which those items of the Work will be completed, but in no event shall it be more than thirty (30) days from Substantial Completion.

The Architect and the College will conduct an inspection, and if they determine the Contractor has Substantially Completed the Project (or a specific phase of the Work, if the Work is to be performed in phases), the College will issue a Certificate of Substantial Completion. If the Architect and the College determine that the Contractor has not achieved Substantial Completion, the College will notify the Contractor in writing and will list the Work and requirements of the Contract Documents that must be completed for Substantial Completion and provide a punchlist. The Architect and the College will also assign a value to the incomplete items to be added to the 2% retainage held after the Certificate of Substantial Completion is issued. The College and the Architect will re-inspect when the Contractor notifies them in writing that those items have been completed.

Any failure of the College or Architect to include incomplete or deficient items in a Certificate of Substantial Completion or a notice regarding a Substantial Completion inspection shall not affect the Contractor's obligation to properly complete all requirements of the Contract.

The College will not issue a Certificate of Substantial Completion unless it can occupy and use the Project (or the phase of the Work) for its intended purpose, and the Contractor agrees that the College's use and occupancy of the Project (or the phase of the Work) shall not affect the Contractor's obligation to complete the Project and requirements of the Contract Documents. The Contractor also agrees that its completion of the Project will not unreasonably interfere with the College's occupancy and use of the Project (or the phase of the Work) and that the College's occupancy will not impede the Contractor's completion of the Work to Final Completion.

Unless otherwise specified in the supplemental General Conditions, a Certificate of Substantial Completion will not be issued unless an unqualified temporary or permanent certificate of occupancy is issued, and the College is able to use and occupy the Project (or the phase of the Work) without interruption.

The issuance of a Certificate of Substantial Completion shall not void or alter any of the other terms of the Contract Documents, including but not limited to terms relating to warranties, or relieve the Contractor of its obligation to complete the Work or remedy defective Work or materials, unless such terms are expressly modified by the Certificate of Substantial Completion.

Guarantee periods for equipment, workmanship and materials shall commence when the Certificate of Substantial Completion is issued or from the completion and acceptance of equipment, workmanship or materials, whichever is later, unless otherwise specified in the supplemental General Conditions or the Certificate of Substantial Completion.

The rights of the Contractor regarding payments upon the issuance of the Certificate of Substantial Completion shall be as provided in the payment provisions of the Contract for Construction and these General Conditions.

## **12.2 Final Completion.**

The Contractor shall notify the Architect and the College in writing when it has completed the entire Project (or a specific phase of the Work, if the Work is to be performed in

phases) and has satisfied all of the requirements of the Contract Documents for Final Completion. The Architect and the College will then conduct an inspection, and if they determine that the Contractor has completed the entire Project (or a specific phase of the Work, if the Work is to be performed in phases) and has satisfied all of the requirements of the Contract Documents for Final Completion, the College will then issue a Certificate of Final Completion. If any items remain incomplete or unsatisfactory, the College will notify the Contractor in writing and list the incomplete or unsatisfactory items. The Contractor shall immediately complete and correct any unfinished items and notify the Architect and the College in writing and request a follow-up inspection for Final Completion.

The Certificate of Final Completion will not be issued until all documents required by the Contract Documents have been provided, including the College's acceptance of final payment and release of liens and claims forms duly executed by the Contractor and any Subcontractors and suppliers who have furnished labor or materials under the Contract, warranties, maintenance and operating instructions, certificates, insurance, shop drawings required, and as-built drawings approved by the Architect. Final Completion must include leaving the entire Project site and the Project (or the phase of the Work) clean, neat and orderly. All distortions, cracks, delaminating and deteriorations of finished surfaces must be remedied. All broken items shall be repaired. All paint spots, stains and plaster must be removed. All unused equipment and excess material shall be removed. The Project and the Project site (or the phase of the Work) shall be clean and finished.

If the Contractor unreasonably delays completing and correcting items needed for the issuance of the Certificate of Final Completion, the College may unilaterally issue a Certificate of Final Completion that lists incomplete and defective items, and that deducts any applicable liquidated damages and the cost of remedying incomplete and defective items from the final amount due to the Contractor under the Contract.

Final payment will not be made until the Certificate of Final Completion is issued, and the final payment shall be subject to the payment provisions in the Contract for Construction and these General Conditions.

## **ARTICLE 13** **SUSPENSION AND TERMINATION OF CONTRACT.**

### **13.1 Suspension By The College.**

The College shall have the right to stop or suspend the Work in whole or in part at any time. The Work may only be stopped or suspended by a written directive of the College's Representative, except in an emergency. The College's Representative may stop or suspend the Work in whole or in part on an emergent basis, either verbally or in writing, but any such emergent suspension or stop Work order shall be confirmed by a written directive from the College's Representative within 48 hours. The College may stop or suspend the Work because of any conditions affecting health or safety on or off site, any dangerous condition, any environmental hazard, the convenience of the College, or the public interest. If a directive to

stop or suspend all or part of the Work includes directions to secure the site, the Contractor shall perform the Work required in the directive. The Contractor shall also maintain the safety and security of the Project during the suspension for the protection of the site, Work in place, materials and equipment on site, persons on or near the site, and the College's property.

If all or part of the Work is suspended in response to a problem or condition caused by the Contractor's performance of its Contract, or parties other than the College itself, or conditions over which the College has no control, the Contractor will not be entitled to any additional compensation for the suspension. If the College directs the suspension of Work because of the improper performance of the Contract by the Contractor or those performing its Contract, the Contractor will not be entitled to any extension of any Contract Times or additional compensation by reason of the suspension. If a suspension is directed for reasons other than the fault of the Contractor or others involved in its performance of the Contract, the Contractor will be entitled to an extension under and to the extent authorized in Article 9, and additional compensation under and to the extent authorized by Article 11.

### **13.2 Termination For Convenience.**

The College may, by a written directive, terminate the Contract at any time before completion for the College's convenience or where it concludes that it is in the public interest to do so. The Contractor shall complete any items of Work specified in the notice of termination for convenience and any Work necessary to make the site safe for all persons and property at or near the Project site when the College terminates the Contract for convenience under this Article.

Absent the Contractor fault or violation of the Contract, the Contractor shall be paid in full for all properly completed Work, subject to the payment provisions in the Contract for Construction and these General Conditions. The Contractor will not be entitled to payment for costs and mark-ups for Work or materials not provided before the termination, or costs for Work and materials not provided unless the Contractor cannot avoid liability to pay those costs, or profit or overhead on the portion of the Contract that will not be performed because of the termination, or other types of damages. The extra compensation payable to the Contractor in connection with a termination for convenience may include the cost of materials or equipment purchased for the Project before termination but not installed if the Contractor cannot otherwise use or sell them.

The Contractor will also be entitled to reasonable termination costs in reasonable amounts for additional direct costs in connection with the termination, but not administrative, home office or overhead costs, lost profit, or consequential damages. In addition, any claims shall be subject to the provisions in the Contract for Construction and these General Conditions regarding claims and the maintenance of cost records.

The Contractor shall include provisions similar to this Article in subcontracts and supply contracts for the Project. When a termination for convenience is directed by the College, the Contract shall be closed out in accordance with the provisions of the Contract for Construction and these General Conditions regarding payment and Project completion.



### **13.3 Termination For Cause.**

The College may terminate the Contract for cause if the Contractor (i) commits violations of the Contract Documents, (ii) fails to perform the Work in accordance with the Contract Documents including the Project Schedule, (iii) fails to comply with applicable laws, rules or regulations, (iv) fails to pay Subcontractors or suppliers to the extent reasonably required, (v) becomes insolvent or becomes a debtor in a bankruptcy proceeding, (vi) fails to pay its debts, (vii) is found to have made false or misleading statements to the College in writing in obtaining the Contract or payments, (viii) fails to comply with employment discrimination laws, (ix) fails to pay prevailing wages, (x) fails to maintain or renew the required insurance, (xi) fails to maintain proper protection for the safety of persons or property on the site, (xii) fails to comply with reasonable and authorized directives of the College under the Contract, or (xiii) assigns its rights or interests under the Contract or payments under the Contract to any third party.

If the College terminates the Contract for cause, it shall first send a notice of intent to terminate to the Contractor and the Contractor's surety. The notice shall direct the Contractor to remedy or eliminate the deficiency within a specified time if the problem is one that can be eliminated. If the Contractor fails to reasonably comply with the directive and notice, the College may after 10 days issue a notice of termination to the Contractor and its surety which terminates the Contract effective immediately and specifies the reason for the termination.

If the Contract is terminated, the Contractor shall secure the site and take measures to leave the site safe for persons, material, Work in place and equipment before departing the site, and shall remove all tools and equipment within 5 days of the termination effective date. The Contractor shall not remove any materials or equipment stored on site unless directed to do so by the College. When the Contract is terminated, the Contractor shall deliver materials purchased for the Project and paid for by the College, but not stored on site, together with all appropriate warranties and guaranties to any location designated by the College.

If the Contractor's surety does not take over the completion of the Work in accordance with this Article, the College may appropriate any or all materials on the site that may be suitable and acceptable and may enter into an agreement for the completion of the Work with another contractor, or use other methods to complete the Work.

All damages, costs and charges incurred by the College together with the cost of completing the Work, will be deducted from any monies due or which may become due to the Contractor for Work properly completed by it before the termination. If such expenses exceed the sum available from the unpaid Contract Price, the Contractor and its surety shall be liable and shall pay to the College the amount of such excess in addition to other damages.

The rights and remedies of the College in connection with a termination for cause shall be in addition to other rights and remedies which it has under law, the Contract, and the Contractor's bond.

If the College terminates the Contract for cause and it is subsequently determined by a court that the Contractor was not in default, or that the termination was legally unjustified, the termination will be deemed to be a termination for convenience under this Article, and the rights

and remedies of the Contractor and its surety for the termination will be limited to those which exist in connection with a termination for convenience. If the College terminates the Contract for cause, the Contractor may not file a suit to recover on any claims arising out of the Project before the Work is Substantially Complete.

#### **13.4 Surety Takeover Following Termination For Cause.**

If the College terminates the Contractor for cause, the Contractor's performance bond surety may elect to takeover and complete the Contractor's Work and obligations under its Contract. If the surety elects to take over the completion of the Contract, it may only do so on the following conditions:

- (a) The surety must notify the College that it will take over completion of the Contract by a written notice of intent signed by a representative authorized to bind the surety within 5 calendar days of the surety's receipt of the College's notice of termination.
- (b) The surety and the College must execute a written takeover agreement within 10 days after the surety sends its notice of intent to takeover. The takeover agreement signed by the surety and the College, must:
  - i. contain an acknowledgement and agreement by the surety to assume the obligation to complete the balance of the Work under the Contract and to perform all of the Contractor's obligations under the Contract at the surety's sole cost and expense, and to utilize only contractors approved by the College to complete the Work, which approval shall not be unreasonably withheld;
  - ii. provide that the surety is entitled to be paid the unpaid balance under the terminated Contractor's Contract in accordance with and subject to the terms of the Contract for Construction and these General Conditions;
  - iii. provide that the surety is not relieved of any of its obligations under its payment and performance bond for the Project, and that the College retains its right to withhold money for Contract payments to compensate for damages or for other reasons where authorized under the Contract for Construction or these General Conditions; and
  - iv. provide that it is without prejudice to and is subject to all of the rights and remedies of the College, the surety, and the defaulted Contractor, and the surety may not require the College to agree to a takeover agreement that seeks to extinguish any such rights.
- (c) The surety must also pay without delay all obligations of the terminated Contractor for Work and materials on the Project, subject to a reasonable allowance of time to investigate and verify claims.

#### **13.5 Suspension By The Contractor For Non-Payment.**

If the Contractor is not paid sums due under an approved invoice within thirty (30) days of the billing date, it may suspend performance without penalty for breach of Contract, but only

after providing the College with 7 days written notice of non-payment, and only in the event that the College fails to furnish the Contractor, within that 7 day period, with a written statement of the amount withheld and the reasons for the withholding. Nothing herein shall be construed to excuse the Contractor's nonperformance, or to limit the College's rights and remedies relating to such nonperformance, with regard to any monies withheld from the Contractor upon the proper notice provided under this Article, or with regard to any Contractor claim disputed by the College.

**ARTICLE 14**  
**WARRANTY/DEFECTIVE WORK AND MATERIALS**

**14.1 General Work One Year Warranty; HVAC Systems Two Year Warranty**

The Contractor warrants and guarantees for a one year period that all Work, materials and equipment (and for a two year period that all HVAC work) conform to the Contract Documents and will not fail or manifest defects, that the Project and all its components will be fit for their intended functions, and that all material and equipment will be new and of good quality.

The general one year warranty period (or two year warranty period for HVAC work) shall commence when the Certificate of Substantial Completion is issued, and the one year period (or two year period for HVAC work) shall commence on that date for all components of the Project, including any equipment activated and operated before Substantial Completion, such as HVAC systems, electrical systems and elevators.

During the one year warranty period (or two year warranty period for HVAC work), the Contractor shall repair and remedy at its own expense any premature failure, defects or deficiencies in any Work, materials or equipment that are discovered or that develop during the one year period (or two year period for HVAC work), and shall do so within 5 days after receipt of a written warranty claim from the College. The Contractor shall also repair damages caused by any failure or defect covered by this warranty. A failure to provide the warranty service required shall constitute a breach of this warranty obligation as well as other applicable provisions of the Contract. This warranty shall not cover failures caused solely by substantial misuse or abuse by the College.

This general one year warranty (or two year warranty for HVAC work) is intended to provide the College with prompt warranty service for all aspects of the Project for the one year period (or two year period for HVAC work). It is not intended to limit or extinguish any additional warranties required by any of the Contract Documents, or provided by manufacturers of systems, equipment or materials provided under the Contract. It is not intended to eliminate or reduce the College's rights and remedies under the Contract Documents and law for defects and deficiencies in the Work, materials and equipment, or the time period of the Contractor's general responsibility and liability.

## **14.2 Defective Work, Materials And Equipment.**

Apart from the general one year warranty (or two year warranty for HVAC work) provided for in this Article, the Contractor shall be responsible for defective Work, materials and equipment and any failure of these items to comply with the Contract Documents. This obligation shall extend beyond Substantial Completion, Final Completion and the general one year warranty (or two year warranty for HVAC work) in this Article.

If defects in the Work, materials or equipment or non-conforming items are discovered during construction and before Final Completion, the Contractor shall promptly correct them at its own expense. If the Contractor fails to correct defective or non-conforming Work, material or equipment in response to a written notice from the College, either during construction or after Final Completion, the College may employ others to provide the remedial work and the Contractor and its surety shall be liable for the cost thereof and damages incurred by the College. The Contractor and its surety shall also be liable for the cost of making good all Work and material destroyed or damaged by defects or the correction of defects.

If any portion of the Contractor's Contract Price remains in the custody of the College, either earned or unearned, the College may deduct money paid to others to remedy defects after notice is sent to the Contractor and damages incurred by the College when the Contractor fails to provide a remedy in response. The Contractor's responsibility for defects and non-conforming Work, material and equipment shall not be limited in time except by applicable law.

The Contractor's responsibility for defective Work shall not be affected by either the performance or the lack of performance of inspections by the College or the Architect. The issuance of payments, a Certificate of Substantial Completion or a Certificate of Final Completion shall not constitute acceptance of Work, material or equipment that is deficient or not in compliance with the Contract, or limit the Contractor's warranty or the other Contract obligations.

## **ARTICLE 15**

### **INDEMNIFICATION/LIABILITY TO THIRD PARTIES.**

#### **15.1 The Contractor's Indemnification Obligation.**

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the College, the State of New Jersey, the New Jersey Educational Facilities Authority, Trenton State College Corporation, and any other persons or entities designated by the College, and the officers, directors, principals, attorneys, agents, servants, and employees of any of them (collectively the "Indemnified Parties") from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from: (1) performance of the Work, whether such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom caused in whole or in part by the negligent or willful acts or omissions of the Contractor, Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder or (2) any one or more of the items set forth in

this Article. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Article.

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

The indemnity, defense, and hold harmless obligation set forth in this Article shall be supplemented by the following:

- (a) any claims or liens of Subcontractors, except to the extent that the non-payment upon which the claim or lien is predicated resulted solely from the College's wrongful failure to pay the Contractor sums due under the Contract;
- (b) any fines, penalties, liquidated damages, assessments or other executions imposed by any governmental authority having jurisdiction over the Project by reason of the Contractor's failure to comply with any requirement of the Contract;
- (c) any losses, damages, or expenses incurred by reason of the Contractor's failure to obtain and maintain in force or cause to be obtained and maintained, the insurance required by the terms of the Contract;
- (d) any losses, damages, or expenses incurred by reason of any failure (whether or not specifically identified herein) by the Contractor to perform its obligations under the Contract Documents or any breach of the Contract;
- (e) any claims, damages, or expenses incurred by reason of the Contractor's infringement or alleged infringement of any patent, copyright, or other intellectual property or similar rights; and
- (f) any claims, damages, liquidated damages, penalties, or fines assessed against the College, directly or indirectly, solely or partially by reason of the Contractor's failure to comply with any applicable laws, codes, statutes, or regulations.

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

The College shall give written notice to the Contractor of claims and suits for which indemnification may be claimed pursuant to this Article.

The foregoing obligations shall survive the completion of the Work and final payment to the Contractor (or the sooner termination of the Contract) with respect to all matters accrued during the term of the Contract and such obligations shall not be construed to negate, abridge or reduce any other rights, obligations or indemnity which would otherwise exist as to a party or person indemnified by this Article.

### **15.2 The Subcontractor's Indemnification Obligation.**

The Contractor shall cause the indemnification obligations set forth in this Article to be included in all contracts with its Subcontractors.

## **ARTICLE 16** **INSURANCE AND BONDS.**

### **16.1 The Contractor's Insurance.**

The Contractor shall purchase from, and maintain with a company or companies lawfully authorized to do business in the State of New Jersey, insurance for protection from claims under workers' compensation and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and claims for damages, including the Work itself, to property which may arise out of or result from the Contractor's operations and completed operations under the Contract, whether such operations be by the Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them, until at least 1 year after the Final Completion and acceptance of the Project. This insurance shall be written for not less than the limits set forth below or as required by law, whichever coverage is greater, and shall include contractual liability insurance applicable to the Contractor's obligations under Article 15 (Indemnification). The Contractor expressly agrees that any insurance protection required by the Contract Documents shall in no way limit the Contractor's obligations under the Contract, and shall not be construed to relieve the Contractor from liability in excess of such coverage. Nor shall it preclude the College from taking such actions as are available to it under any other provisions of the Contract for Construction, these General Conditions or the law.

#### **16.1.1 Types and Minimum Amounts of Insurance:**

- (a) **Commercial General Liability Insurance (CGL).** Commercial General Liability insurance ISO 1088 or later occurrence form of insurance including contractual liability with limits of at least five million dollars (\$ 5,000,000 ) combined single limit for bodily injury and property damage liability for each occurrence. The CGL policy shall also include products/completed operations with limits of at least five million (\$ 5,000,000 ) per occurrence. This insurance shall be maintained for at least 1 year after the Final Completion of the Project.
- (b) **Automobile Liability Insurance.** Comprehensive Automobile Liability insurance covering owned, non-owned, and hired vehicles. The limits of liability shall not be less than one million dollars (\$ 1,000,000 ) combined single limit for bodily injury and property damage for each occurrence.

- (c) **Workers Compensation/ Employer's Liability.** Worker's Compensation Insurance applicable to the laws of the State of New Jersey and other State or Federal jurisdictions required to protect the employees of the Contractor and any Subcontractor, sub-subcontractor or supplier who will be engaged in the performance of the Contract. The certificate must so indicate that no proprietor, partner, executive officer or member is excluded. This insurance shall include Employers' Liability Protection with a limit of liability not less than one million dollars (\$1,000,000) bodily injury, each occurrence, one million dollars (\$1,000,000) disease, each employer, and one million dollars (\$1,000,000) disease, aggregate limit.

All required insurance coverages must be written by insurance companies acceptable to the College. All insurance companies must have a minimum A.M. Best's financial strength rating of A- or better, or an equivalent rating from another respected rating agency, and an A.M. Best's size rating of VII or greater.

**16.1.2 Additional Insureds.** All insurance required herein, except Worker's Compensation, shall name The College of New Jersey, the State of New Jersey, the New Jersey Educational Facilities Authority, Trenton State College Corporation and any other persons or entities designated by the College as additional insureds.

**16.1.3 Cancellation.** The certificates of insurance shall provide for 30 days written notice to the College before any cancellation, expiration or non-renewal during the term the insurance is required by the Contract.

**16.1.4 Evidence of Insurance.** The Contractor shall when the Contract for Construction is signed and before beginning the Work required under the Contract, provide the College with valid certificates of insurance signed by an insurance provider or authorized agent or underwriter to evidence the Contractor's insurance coverage as required in this Article, and also copies of the policies themselves. The certificates of insurance shall specify that the insurance provided is of the types and in the amounts required in this Article, and that the policies cannot be canceled except after 30 days written notice to the College. The Contractor shall also be required to provide the College with valid certificates of renewal when policies expire. The Contractor shall also, when requested, provide the College with additional copies of each policy and all endorsements required under the Contract, which are certified by an agent or underwriter to be true copies of the policies and endorsements issued to the Contractor.

**16.1.5 Remedies for Lack of Insurance.** If the Contractor fails to renew any of its required insurance policies, or any policy is canceled, terminated or modified, the College may refuse to pay monies due under the Contract. The College, in its sole discretion and for its sole benefit, may use monies retained under this Article to attempt to renew the Contractor's insurance or obtain substitute coverage if possible for the College's sole benefit, and may invoke other applicable remedies under the Contract for Construction and these General Conditions including claims against the Contractor and its surety. During any period when the required insurance is not in effect, the College may also, in its sole discretion, either suspend the Work under the Contract or terminate the Contract.

## **16.2 The Subcontractor's Insurance.**

The Contractor shall ensure that its Subcontractors purchase and maintain insurance on the same terms and with coverages customary for each trade as required by the Contractor under the Contract. The Contractor shall contractually obligate its Subcontractors to indemnify, defend, and hold harmless the College upon the same terms and conditions that the Contractor is required to do so as provided in Article 15 of these General Conditions (Indemnification).

## **16.3 Payment And Performance Bond.**

The Contractor is required to furnish the College with a payment bond and a performance bond from an approved surety as described in this Article and in the bid documents. The bonds shall conform to N.J.S.A. 2A:44-147. The Contract will not become effective until these bonds are provided to and approved in writing by the College. The bonds must also be accompanied by the surety disclosure statement and certification required by N.J.S.A. 18A:64-68.

# **ARTICLE 17** **DISPUTE RESOLUTION.**

## **17.1 Mediation.**

If a dispute or claim arises out of or relates to the Contract, or the breach thereof, and if the dispute cannot be settled through negotiation, the dispute or claim may, at the College's sole option, be subject to mediation administered by the American Arbitration Association under its Construction Industry Mediation Rules as a condition precedent to binding dispute resolution. The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in Mercer County, New Jersey, at the offices of the College's attorneys, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable in any court having jurisdiction thereof.

## **17.2 Method Of Binding Dispute Resolution.**

For any dispute or claim, not resolved by mediation pursuant to this Article, the method of binding dispute resolution shall be litigation in the state or district courts of the State of New Jersey, unless the College, in its sole discretion, decides to submit the dispute or claim to arbitration pursuant to this Article.

## **17.3 Arbitration (If The College Elects To Arbitrate).**

If the College decides, in its sole discretion, to submit a dispute or claim to arbitration rather than litigation as provided above, the arbitration shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Contract unless the parties mutually agree otherwise. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The arbitrator shall be a New Jersey licensed attorney with at least twenty (20) years' experience practicing in construction law. In the event that the parties mutually agree to use a panel of three arbitrators, then the construction attorney will be the



presiding arbitrator, one of the arbitrators will be a registered architect and the other will be a contractor, all of whom shall be neutral and independent. This Article shall not preclude the College or Contractor from instituting legal action to discharge an invalid construction lien. The arbitration hearing shall be held in Mercer County, New Jersey, at the offices of the College's attorneys, unless another location is mutually agreed upon.

A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the claim, dispute or other matter in question would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the claim, dispute or other matter in question.

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

The award rendered by the arbitrator(s) shall be a reasoned award and shall include a statement of findings of fact and conclusions of law and shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

#### **17.4 Consolidation Or Joinder.**

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

The College, in its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

#### **17.5 Work During Pendency Of Dispute.**

Unless otherwise instructed by the College, the Contractor shall carry on its Work during the pendency of any dispute hereunder, and the College shall continue making payments to the Contractor of undisputed amounts.

## **17.6 Prompt Payment Claims.**

Notwithstanding the foregoing, disputes regarding only whether a party has failed to make payments required pursuant to New Jersey's Prompt Payment Act may be submitted to alternative dispute resolution as provided in N.J.S.A. 2A:30a-2(f). In such event, the College and the Contractor shall share equally the fees and expenses of the selected mediator. Provided, however, that nothing herein shall be construed, in whole or in part, as a waiver, release or modification of the provisions of the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq., as it governs claims against the College.

## **17.7 The Contractor's Claims: Procedures And Limitations.**

Claims by the Contractor against the College shall be subject to the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1, et seq., including the notice and time for suit provisions. For the purpose of determining the time within which the Contractor must file suit under the New Jersey Contractual Liability Act, "completion of the contract" shall be deemed to have occurred upon achievement of Substantial Completion as defined in these General Conditions.

The Contractor also agrees that it shall not be entitled to assert claims against the College for any compensation beyond that provided for in the Contract by reason of the acts or omissions of any third parties, including but not limited to the Architect and any other contractor on the Project. The Contractor may not assert claims for extra costs for home offices expenses, home office overhead, lost profits or revenue, or consequential damages as that term is defined in law. All claims shall also be subject to all other pertinent provisions of the Contract for Construction and the Contract Documents including these General Conditions. The Contractor also agrees that it may not assert any claims for extra costs or damages unless it maintains all the records of its estimated and actual costs as required by the Contract for Construction and these General Conditions.

## **17.8 Dispute Resolution Process In The Contractor's Subcontracts.**

The Contractor shall include this dispute resolution process in all of its contracts with any Subcontractors or suppliers on this Project.

# **ARTICLE 18** **MISCELLANEOUS.**

## **18.1 Prevailing Wage.**

The Contractor and its Subcontractors shall comply with the New Jersey Prevailing Wage Act, N.J.S.A. 34:11-56.25 through 56.57. Workers employed by the Contractor or any Subcontractor or sub-subcontractor in the performance of services directly on the Project must be paid prevailing wages. As required by N.J.S.A. 34:11-56.27 and 56.28, the Contract cannot become effective until the College obtains from the New Jersey Department of Labor a determination of the prevailing wage rates applicable to the Project as of the Contract award date and attaches a copy to the Contract. As required by N.J.S.A. 34:11-56.27, the Contractor or any

Subcontractor may be terminated if any covered worker is not paid prevailing wages on the Project, and the Contractor and its surety shall be liable for any additional costs which result. The Contractor and its Subcontractors must be registered with the New Jersey Department of Labor (N.J.S.A. 34:11-56.51 et seq.), and the prevailing wage rates must be posted at the job site (N.J.S.A. 34:11-56.32). The Contractor and its Subcontractors must prepare accurate certified records of wages paid for each worker on the Project (N.J.S.A. 34:11-56.29), and copies for the period covered by each invoice must be attached to the invoice submitted under the Contract. In accordance with N.J.S.A. 34:11-56.33, the Contractor's final invoice must include a statement of all amounts still then due to workers on the Project. The Contractor is also cautioned that it must use job titles and worker classifications consistent with those approved by the Department of Labor, and that, if it intends to pay apprentice rates, it must comply with the Department of Labor's regulations at N.J.A.C. 12:60-7.1 through 7.4.

If the State's Prevailing Wage Act is amended, or the language stated herein is inconsistent with the language contained in the State's Prevailing Wage Act, the language of the State's Prevailing Wage Act shall control.

## **18.2 Employment Discrimination.**

The Contractor and any Subcontractors employed by it shall comply with N.J.S.A. 10:2-1 through 10:2-4 and N.J.S.A. 10:5-1 et seq., including N.J.S.A. 10:5-31 through 10:5-35, which prohibit discrimination in employment in public contracts. The statute and the rules and regulations promulgated thereunder shall be considered to be part of the Contract and binding upon the Contractor and its Subcontractors. If the College is notified of any violation of the public contract awarding regulations in accordance with N.J.A.C. 17:27-7.4 concerning the financing of minority and women outreach and training programs, the College reserves the rights to deduct the outreach and training allocation from the Contract. During the performance of the Contract, the Contractor agrees that:

- (a) In the hiring of persons for the performance of Work under the Contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under the Contract, neither the Contractor, its Subcontractors nor any person acting on behalf of the Contractor or any of its Subcontractors, shall, by reason of race, creed, religion, color, national origin, nationality, ancestry, age, sex (including pregnancy), familial status, marital status, domestic partnership or civil union status, affectional or sexual orientation, gender identity or expression, atypical hereditary cellular or blood trait, genetic information, liability for military service, and mental or physical disability, perceived disability, and AIDS and HIV status, discriminate against any person who is qualified and available to perform the Work to which the employment relates;
- (b) Neither the Contractor, its Subcontractors, nor any person acting on behalf of the Contractor or any of its Subcontractors shall, in any manner, discriminate against or intimidate any employee engaged in the performance of Work under the Contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any

such materials, equipment, supplies or services to be acquired under such contract, on account of race, creed, religion, color, national origin, nationality, ancestry, age, sex (including pregnancy), familial status, marital status, domestic partnership or civil union status, affectional or sexual orientation, gender identity or expression, atypical hereditary cellular or blood trait, genetic information, liability for military service, and mental or physical disability, perceived disability, and AIDS and HIV status;

- (c) There may be deducted from the amount payable to the Contractor by the College, under the Contract, a penalty of \$50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the Contract; and
- (d) The Contract may be canceled or terminated by the College, and all money due or to become due hereunder may be forfeited, for any violation of this Article of the Contract occurring after notice to the Contractor from the College of any prior violation of this Article of the Contract. The Contractor and its Subcontractors shall comply with all laws prohibiting discrimination against employees, and shall comply with the provision in the Contract regarding employment discrimination.

If the State's Law Against Discrimination is amended, or the language stated herein is inconsistent with the language contained in the State's Law Against Discrimination, the language of the State's Law Against Discrimination shall control.

### **18.3 Patents.**

If any design, device, material or process covered by patents or copyright is used in the Work, the Contractor shall provide for such use by a suitable agreement with the patent or copyright owner. The Contractor shall bear all costs arising from the use of patented materials, equipment, or processes and all copyrighted materials used on or incorporated in the Work. The Contractor shall defend, indemnify and hold harmless the College and its representatives from any and all claims for infringement by reason of the use of any such patented or copyrighted items.

### **18.4 The Contractor's Compliance With Law.**

The Contractor shall keep fully informed of all federal, state and local laws, ordinances, regulations and orders of agencies that have jurisdiction or authority that in any manner affect those employed on the Project or the Project. The Contractor shall at all times observe and comply with, and cause its agents and employees to observe and comply with, all such laws, ordinances, regulations, and/or orders. The Contractor shall also protect and indemnify, defend and hold harmless the College and its representatives against any claim or liability arising from the violation of any laws, ordinances, regulations, or orders, whether by the Contractor or its employees, agents, Subcontractors at any tier, suppliers or materialmen.

**18.5 Environmental Protection – The Contractor’s Duty To Comply With Applicable Law.**

The Contractor shall comply with all applicable federal, state and local laws and regulations and all conditions of permits pertaining to the protection of the environment. Necessary precautions shall be taken to prevent pollution of streams, lakes, ponds, rivers, wetlands, groundwater, reservoirs, and property by chemicals, fuels, oils, bitumens, or other harmful or hazardous materials as defined by law. The Contractor also shall not pollute the atmosphere from particulate or gaseous matter in violation of applicable law.

**18.6 No Personal Liability Of College Officials.**

In carrying out any of the provisions of the Contract, or in exercising any right or authority granted to them by or in connection with the Contract, there shall be no liability upon any trustee, officer or employee of the College, either personally or as officials of the College, it being agreed that in all such functions they act only as agents and representatives of the College.

**18.7 Recovery Of Monies By The College From Other Contracts With The Contractor.**

When the Contract Documents authorize the College to withhold or deduct money from any monies due to the Contractor, or require the Contractor to pay or return monies for any reason, the College may in its discretion withhold any monies due the Contractor under any other contracts between the Contractor and the College. This right shall not affect the rights of the College against the Contractor or its surety under the Contract, and the College shall not be obliged to exercise this right as to any other contract as a condition of exercising its rights against the Contractor or surety under the Contract.

**18.8 Buy American Requirement.**

The Contractor shall comply with N.J.S.A. 52:32-1 and N.J.S.A. 52:33-1 et seq., which prohibit the use by the Contractor or Subcontractors of materials or farm products produced and manufactured outside of the United States on any public Work. Notwithstanding any inconsistent provision of any law, and unless the head of the department, or other public officer charged with the duty by law, shall determine it to be inconsistent with the public interest, or the cost to be unreasonable, only domestic materials shall be acquired or used for any public work. This Article shall not apply with respect to domestic materials to be used for any public work, if domestic materials of the class or kind to be used are not mined, produced or manufactured, as the case may be, in the United States in commercial quantities and of a satisfactory quality. If the State’s “Buy American” laws are amended, or the language stated herein is inconsistent with the language contained in the State’s “Buy American” laws, the language of the State’s “Buy American” laws shall control.

**18.9 Compliance With Grant Requirements.** The Contractor acknowledges and agrees that if the College receives any grant monies in connection with the Project, the Contractor and its Subcontractors shall comply with all requirements associated with such grant or set forth in such grant agreement.

**18.10 Modification Of Contract.**

No modification or amendment of the Contract shall be effective unless it is in writing and signed by both the College and the Contractor.

**18.11 State Sales Tax Exemption.**

Materials, supplies or services for exclusive use in constructing the Project are exempt from the State Sales Tax Act. Rentals of equipment are not exempt from any tax under the State Sales Tax Act.

**18.12 Successors and Assigns.**

The College and the Contractor respectively bind themselves, their successors and assigns, to the other party hereto and to the successors and assigns of such other party in respect to covenants, agreements and obligations contained in the Contract Documents.

The Contractor shall not assign the Contract, nor shall the Contractor transfer or assign any Contract funds, due or to become due, or claims of any nature it has against the College without the prior written approval of the College. The College in its sole discretion and considering primarily the interests of the College may elect either to grant or to deny such approval. If the Contractor attempts to make such an assignment without the College's prior written approval, the Contractor shall nevertheless remain legally responsible for all obligations under the Contract.

The College shall be entitled to assign its rights hereunder to one or more lenders as collateral for loans which the College may obtain to finance construction of the Project and to a party who presently has or later acquires a legal interest in the premises. The Contractor agrees to execute such certificates, documents and instruments as are reasonably requested by the College, including, without limitation, certificates, documents and instruments that evidence the Contractor's consent to an assignment of the Contract or confirm the absence or existence of a default on the part of the College hereunder.

**18.13 Construction Liens.**

If any Subcontractor or other person working under the Contractor files a construction lien or claim or notice of intention or right to file a lien for or on account of Work, labor, services, materials, equipment or other items furnished under or in connection with the Contract for which the College has paid the Contractor, the Contractor agrees to discharge or remove such lien, claim or notice at its own expense by bond, payment or otherwise within twenty (20) calendar days from the date of the filing thereof, and upon its failure to do so, the College shall have the right to cause any such lien or claim, notice of intention or stop notice to be removed or discharged by whatever means the College chooses, at the sole cost and expense of the

Contractor (such costs and expenses to include legal fees and disbursements). The Contractor agrees to indemnify, defend and hold harmless the College and its representatives from and against any and all such liens, claims or other filings, and actions brought or judgments rendered thereon, and from and against any and all losses, damages, liabilities, costs and expenses, including legal fees and disbursements, which the College may sustain in connection therewith. Further, if any Subcontractor or other person working under the Contractor files a construction lien or claim or notice of intention or right to file a lien for or on account of Work, labor, services, materials, equipment or other items furnished under or in connection with the Contract for which the College has paid the Contractor, the College may, in the College's sole discretion, pay all wages, damages, recoveries, costs and expenses and reasonable counsel fees arising therefrom and deduct the same from any monies due or to become due to the Contractor.

#### **18.14 Independent Contractor Status.**

The relationship of the Contractor to the College is that of an independent contractor. The Contractor agrees that it shall conduct itself consistent with such status, and shall not hold itself out as or claim to be a trustee, officer, employee or agent of the College. The Contractor shall not make any claim or demand for any right or privilege applicable to officers or employees of the College, including but not limited to, workers compensation, unemployment insurance benefits, social security coverage, or retirement benefits.

#### **18.15 Third Party Beneficiary Rights Not Intended.**

It is specifically agreed between the College and the Contractor that no provisions of the Contract Documents are intended to make the public or any member thereof a third party beneficiary of the Contract, or to authorize anyone not a party to the Contract to maintain a suit for personal injuries, property damage or other claims under the Contract. It is also the intent of the College and the Contractor that no individual or firm that supplies materials, labor, services, or equipment to the Contractor for the performance of the Work shall be a third party beneficiary of the Contract.

#### **18.16 Gifts To College Employees And Agents Prohibited.**

The Contractor shall not give any gifts of any nature, nor any gratuity in any form, nor loan any money or anything of value to any College employee or relative thereof, or any agent of the College. The Contractor shall not rent or purchase any equipment or supplies of any kind from any College employee or relative thereof or any agent of the College.

#### **18.17 Compliance With Procurement Statutes.**

The Contractor warrants and represents that the Contract has not been solicited or secured, directly or indirectly, in a manner contrary to the law of New Jersey, and in particular the provisions of N.J.S.A. 18A:64-6.1, 6.2 and 6.3, and that the Contractor has not and shall not violate the law of New Jersey relating to the procurement of or the performance of the Contract by any conduct, including the paying of any gratuity of any kind, directly or indirectly, to any College trustee, employee or officer. Any violation of this Article shall be cause for the College to terminate the Contract, to retain all unpaid and/or unearned monies, and to recover all monies paid. The Contractor shall notify the College in writing of any interest which any trustee, officer,

employee or consultant of the College has in, or association with the Contractor, any other contractor, any Subcontractor, material supplier, consultant, or manufacturer, or other party which has any interest in the Project.

### **18.18 Conflict Of Interest.**

The Contractor shall not pay, offer to pay, or agree to pay, either directly or indirectly, any fee, commission, compensation, gift, gratuity, or other thing of value of any kind to any State officer or employee or special State officer or employee, as defined by N.J.S.A. 52:13D-13b. and e., in the Department of the Treasury or any other agency with which the Contractor transacts or offers or proposes to transact business, or to any member of the immediate family, as defined by N.J.S.A. 52:13D-13i., of any such officer or employee, or any partnership, firm, or corporation with which they are employed or associated, or in which such officer or employee has an interest within the meaning of N.J.S.A. 52:13D-13g.

The solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by any State officer or employee or special State officer or employee from any State vendor shall be reported in writing forthwith by the Contractor to the Attorney General and the Executive Commission on Ethical Standards.

The Contractor may not, directly or indirectly, undertake any private business, commercial or entrepreneurial relationship with, whether or not pursuant to employment, contract or other agreement, express or implied, or sell any interest in the Contractor to, any State officer or employee or special State officer or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to any State agency or any instrumentality thereof, or with any person, firm or entity with which he is employed or associated or in which he has an interest within the meaning of N.J.S.A. 52:13D-13g. Any relationships subject to this Article shall be reported in writing forthwith to the Executive Commission on Ethical Standards, which may grant a waiver of this restriction upon application of the State officer or employee or special State officer or employee upon a finding that the present or proposed relationship does not present the potential, actuality or appearance of a conflict of interest.

The Contractor shall not influence, or attempt to influence or cause to be influenced, any State officer or employee or special State officer or employee in his official capacity in any manner which might tend to impair the objectivity or independence of judgment of said officer or employee.

The Contractor shall not cause or influence, or attempt to cause or influence, any State officer or employee or special State officer or employee to use, or attempt to use, his official position to secure unwarranted privileges or advantages for the Contractor or any other person.

The provisions cited above shall not be construed to prohibit a State officer or employee or special State officer or employee from receiving gifts from or contracting with the Contractor under the same terms and conditions as are offered or made available to members of the general public subject to any guidelines the Executive Commission on Ethical Standards may promulgate.



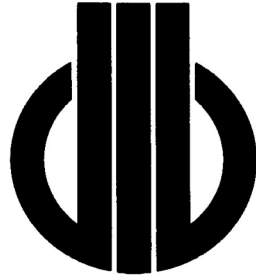
The Contractor shall require its Subcontractors and suppliers to comply with the requirements of this Article.

**18.19 Confidential Information.**

The Contractor shall maintain the confidentiality of information specifically designated as confidential by the College, unless withholding such information would violate applicable law. The Contractor shall require its Subcontractors to maintain the confidentiality of information specifically designated as confidential by the College.

**18.20 Publicity.**

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



**THE COLLEGE OF NEW JERSEY  
CAMPUS FIRE ALARM PROJECT  
EWING, NEW JERSEY**

**FIRE ALARM CABLE INFRASTRUCTURE, HARDWARE  
AND SOFTWARE UPGRADES**

**SPECIFICATIONS**

**Issued For Bid - May 2020**

**Prepared by:  
DLB Associates  
265 Industrial Way West  
Eatontown, NJ 07724**

**(DLB # 47211)**

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**FIRE ALARM - Building Information List**

Revised: 3/12/20

**Note: The existing wire sizes listed here are for reference only. Contractor shall verify the actual sizes and number of wires prior to submitting the bid, if required.**

ID	Building Name	GSF (sqft)	Year Built	Year Renovated	Existing System	Existing Wiring Types	Wiring Age
1	Admin Services Building	11,276	1,934	1997	Siemens	2C#18 Sh & 2C#14 NSh	20+
	ASB Addition	21,064	1,968	1997			20+
2	AIMM Building	72,101	2010		Honeywell	2-2C#16 & 2C#18	10
3	Armstrong Hall	62,288	1961-2001	2019	Simplex	2#18 Sh & 2#16 NSh	25+
	Armstrong Parking Garage	26,000	1997				33
5	Biology Building	77,893	2001		Simplex	2#18 Sh & 2#16 NSh	20+
6	Bliss Hall	51,759	1935	1999	Simplex	2#18 Sh & 2#16 NSh	20
	Bliss Annex	21,095	1978				32
7	Brower Student Center	91,861	1976	2017	Honeywell	2-2C#18 & 2C#14	3
8	Business Building	46,000	1999		Simplex	2C#18 Sh & 2C#16 NSh	20+
9	Centennial Hall	49,944	1954		Honeywell	2-2C#16 & 2C#14	50+
10	Cromwell Hall	85,847	1967	1995	Siemens	2#18 Sh & 2#14 NSh	25
11	Decker Garage	264,238	1995		Simplex	2#18 Sh & 2#16 NSh	20+
12	Decker Hall	94,438	1963	1996	Simplex	2#18 Sh & 2#16 NSh	20+
13	Education Building	79,885	2012		Honeywell	2C#16 & 2C#18	8
14	Eickhoff Hall	147,100	1992		Honeywell	2C#18 & 2C#18	18
15	Ely-Allen-Brewster	49,096	1931	1993	Simplex	2#18 Sh & 2#16 NSh	25+
16	Fire Pump House	480	2019		Honeywell	2#16 & 2#14	1
17	Forcina Hall	77,380	1969	Faraday / Standard Time			N/A
18	Forcina Garage	50,752	2002		Honeywell	2#18, 2#16 & 2#18	18
19	Green Hall	71,808	1931		Honeywell	2-2C#18 & 2C#18 & 2C#14	50+
20	Hausdoerffer Hall	70,639	2009		Honeywell	2C#18 & 2C#18	11
21	Kendall Hall	64,300	1932	1993	Honeywell	2#18 & 2#14	27
22	Gitenstein Library	153,515	2005		Honeywell	2C#18 & 2C#18	15
23	Trenton Hall	33,097	1997		Siemens	2#18 Sh & 2#14 NSh	20+
24	Maintenance Building	21,049	1970	Standard Time			N/A
25	Metzger Garage	340,000	2004		Honeywell	2C#18 & 2C#14	16
26	Music Building	50,200	1993		Honeywell	2C#18 & 2C#18	25+
27	New Residence Hall	57,875	1986		Honeywell	2C#18 & 2C#18	30+
28	Norsworthy Hall	43,200	1936	2016	Honeywell	2C#18 & 2C#18	2
29	Packer Hall	89,075	1932	1986	Simplex	2#18 Sh & 2#16 NSh	25+
30	Phelps Hall	70,639	2009		Honeywell	2C#18 & 2C#18	11
31	Powerhouse	11,700	1961		Honeywell	2C#18 & 2C#14 & 2C#18	50+
32	Recreation Center	53,861	1979		Honeywell	2C#16 & 2C#18	31
33	Roscoe Hall and Addition	43,574	1934		Honeywell	Unknown	50
		65,360	1968			2C#18 & 2C#18	50

**FIRE ALARM - Building Information List**

Revised: 3/12/20

**Note: The existing wire sizes listed here are for reference only. Contractor shall verify the actual sizes and number of wires prior to submitting the bid, if required.**

ID	Building Name	GSF (sqft)	Year Built	Year Renovated	Existing System	Existing Wiring Types	Wiring Age
34	Science Complex	123,068	2002		Siemens	2#18 Sh & 2#14 NSh	15+
35	Soccer Field Press Box, Bathrooms and Concession Stand	2,000	2005		local	Unknown	15
36	Social Science	74,000	2001		Honeywell	2C#16&2C#18	19
37	Spiritual Center	4,450	2004		Honeywell	2C#18&2C#18	16
38	Stadium Concessions Stand	2,335	2006		Honeywell	2C#16&2C#14	15
	Stadium Press Box	2,000	1999		To Gen Bldg	Unknown	21
39	Stadium Generator Building	1,000	1999		Simplex	2C#16&2C#14	21
40	STEM Building	36,000	2018		Honeywell	2C#16&2C#14	2
41	Town House East	68,212	1995		Siemens	2#18 Sh & 2#14 NSh	20+
42	Town House South	65,000	1998		Siemens	2#18 Sh & 2#14 NSh	20+
43	Town House West	65,537	1995		Siemens	2#18 Sh & 2#14 NSh	20+
44	Travers/Wolfe Garage	112,692	2002		Honeywell	2#18 Sh & 2#16 NSh + 2#14sh & #22(strobes)	20+
45	Travers/Wolfe Halls (First Floor)	N/A	1971	1993	Simplex	N/A	N/A



## Guidance For SARS-CoV-2 Virus & COVID-19

*These recommendations were developed based on recommendations by the Center for Disease Control (CDC), the Occupational Health and Safety Administration (OSHA), and the NJ Department of Health (NJDOH) to help prevent the spread of COVID-19. Please refer to the websites listed below for the most up to date information.*

Definitions:

- **COVID-19:** A respiratory disease, caused by the SARS-CoV-2 virus; symptoms include mild to severe respiratory illness with fever, cough, difficulty breathing, and sore throat
- **SARS-CoV-2 (coronavirus):** A virus that can cause the COVID-19 disease

The SARS-CoV-2 virus is thought to spread mainly from person to-person, including between people who are in close contact with one another and through respiratory droplets produced when an infected person coughs or sneezes.

Although it's not thought to be the primary way it spreads, it may be possible that a person can get the COVID-19 disease by touching a surface or object that has the virus on it and then touching their own mouth, nose, or eyes.

Workers who are known to be infected with COVID-19, have symptoms of the disease, or have been exposed to someone known to be infected (whether you show symptoms or not):

- CALL your doctor for guidance.
- Inform your supervisor that you will need to self-isolate and cannot come to work.

Workers without symptoms, please follow these procedures to help limit your chance of exposure:

- Wash your hands often with soap and water for at least 20-seconds. If soap and water are not available, use hand sanitizer containing at least 60% alcohol (until you can wash your hands).
- Avoid touching your mouth, nose, and eyes with unwashed hands.
- When you cough or sneeze, use the inside of your elbow or cover your mouth and nose with a tissue. Throw used tissues in the trash and immediately wash hands with soap and water for at least 20-seconds. If soap and water are not available, use hand sanitizer containing at least 60% alcohol (until you can wash your hands).
- Avoid using another worker's phone, desk, office, or other work tools and equipment, whenever possible. If necessary, clean and disinfect them before and after use.
- Practice social distancing by keeping at least 6-feet between you and others.
- Do not shake hands or touch each other – use other non-contact methods of greeting.
- Drop off tools, keys, packages, or other equipment for others to pick up. Avoid direct deliver/contact with others. If necessary, clean and disinfect them before and after use.
- Minimize contact among coworkers, vendors, staff, students, etc. by replacing face-to-face interactions (e.g. social distancing, phone, email, video call, etc.).

For more information, please visit the below websites or contact The Office of Occupational Safety and Environmental Services (OSES):

- [www.cdc.gov/coronavirus/2019-ncov](http://www.cdc.gov/coronavirus/2019-ncov)
- [covid19.nj.gov/index.html](http://covid19.nj.gov/index.html)



SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of all work noted on the Contract Drawings and in these specifications for the Campus Alarm Cable Infrastructure Improvements.

- 1. Project Location: The College of New Jersey, Ewing New Jersey
- 2. Owner: The College of New Jersey, State of New Jersey

- B. This project specification is for the campus fire alarm upgrade project. This project is divided up into two (2) distinct sets of drawings which are identified as follows:

- a. Part A : Cable Infrastructure
- b. Part B : Hardware And Software

- C. SUMMARY of Work Not Intended To Be All Inclusive :

- 1. Part A : Cable Infrastructure

- a. Conduit Installations:

- 1) Install Underground Conduit Duct Banks Between Building as Identified on Drawings For Fiber Cable Routing. This Will Require A Minimum Of 2-4" PVC Conduits Run In Concrete-encased Duct Banks.
- 2) Install New Pathways Inside The Buildings In Electrical / Mechanical Rooms And Other Areas As Identified On Drawings For Routing The New Fiber.

- b. Fiber Cable Installations:

- 1) Install New Fiber Communication Infrastructure Between Buildings. Fiber Shall Be Routed Continuous (Unspliced) From MDF Room In One Building To MDF Room In Another Building. This Includes Routing Fiber In Underground Duct Banks And From Point Of Entry (POE) In The Buildings To MDF Room. These Pathways May Be A Combination Of New Conduits And Existing Spare Conduits.
- 2) Install Fiber From MDF Room To WCH Which Is To Be Located In The Vicinity Of The Fire Alarm Equipment In Each Building as identified on the Drawings. Terminate All Fibers At All Locations.

- 3) Where Indicated Pull Out Existing Communication Fiber Cable Between Building And Install New Larger Fiber Cables That Would Include Fibers For Both New Fire Alarm Communication And The Replacement Fibers For Existing IT Requirements. Terminate all Fibers. Disconnection Of Jumpers On Existing Fibers Will Be By TCNJ IT Department.
- 
2. Part B: Hardware and Software
    - a. Overview
      - 1) This part of the project will consist of three phases that will be utilized in order to achieve the overall goal of a fully addressable campus fire alarm system while achieving the immediate goal of replacing the campus Life Safety Management System.
      - 2) The First Phase Of The Project Consists Of A New Fire Alarm Campus Front End System ( Life Safety Management System ) To Integrate All 43 Existing Buildings. In This Phase A Minimum Of 23 Buildings Must Be Integrated At A Device Point ID Level Into The New Campus Front End System. This May Require Replacement Of All Fire Alarm Devices And Wiring At Some Buildings Depending On The Vendor Bidding This Project.
      - 3) Phase 2 And Phase 3 Of This Project Each Shall Consist Of Any Specific Vendor Modifications Required To Provide A Fully Addressable Connection Of An additional 10 Buildings ( Each Phase ) From The Remaining Buildings.
      - 4) The Phasing Of Buildings Will Depend On The Fire Alarm System Manufacturer Selected.
    - b. Life Safety Management System (LSMS)
      - 1) Installation Of A Life Safety Management System (LSMS) With Workstations At Admin Services and Power House And With Servers At Green and Cromwell That Will Enable Device Level Communication For Every Building Level Addressable Device Connected To The System. This Shall Include All Functionality Currently Implemented In the Existing Honeywell xBSI System Such As; Graphic Plans For Each Building, Device Status, Alarm Status, Alarm Control, Trend Logs, Etc.
      - 2) For Initial Installation Of New FACP's In All Buildings Where New FACP's Will Act As Intermediary To Existing Building System During The Interim Period, The New Panels Shall Be Integrated Into The New LSMS System And Shall Also Monitor The Existing Building Level Fire Alarm Control Panel For Trouble And Tamper. The New Panel Installed Shall Be Of Capacity To Be Able To Accommodate Complete Building Upgrade At A Later Date To Provide Future Integration With the New Campus Wide Front End.

- c. Building Fire Alarm Systems
  - 1) Replacement Of Building Fire Alarm System ( Panel And Devices ) At Forcina Hall And Maintenance Buildings Which Will Include New Fire Alarm Control Panel, Devices, Conduit, Cabling, Etc. The Replacement System Shall Be Fully Compatible And Integrated With The New LSMS Being Installed.
  - 2) Replacement Of Fire Alarm System And All Devices At The Following Other Structures: Stadium Generator/ Press Box, Soccer Press Box, Stadium Concession and Fire Pump. These Will Include New Fire Alarm Control Panel, Devices, Conduit, Cabling, Etc. The Replacement System Shall Be Fully Compatible And Integrated With The New LSMS Being Installed.
  - 3) Replacement / Addition Of Fire Alarm Panels In All Other Buildings On Campus With Panels That Are Fully Compatible With The New LSMS Being Installed. This will include installation of New FACP's in the remainder of the buildings To Establish Point-Level Intelligence And Fully Addressable Systems In All Campus Facilities. All new FACP's will be integrated into the new campus LSMS.
  - 4) Depending On The Contractor-Manufacturer That Wins The Bid, Some Buildings Will Require Full Replacement Of All Existing Devices To Provide Point-Level Addressability At The New LSMS. For These Buildings, The Contractor Shall Furnish A Code-Compliant Design With Complete Design Documents And Shop Drawings For The Buildings. The Shop Drawings Shall Comply With The Recommendations And Requirements In The Documentation Section Of The Fundamentals Chapter In NFPA 72.
  - 5) The Existing Fire Alarm System In The Buildings Shall Remain Operational And Unimpaired Until The Replacement System Is Installed, Fully Functional And Communicating With The LSMS. Impairments Of The Existing System Shall Be Minimized And Coordinated With The College As Per The Project Documentation. Fire Watch Will Be Required During All Impairments. All Work Causing Impairment Of The Building Fire Alarm System Shall Be Scheduled During Off Hours.
- d. Addition Of A Number Of Devices To Address Code Compliance Issues In The Following Buildings; Centennial Hall, Eickhoff Hall, Kendall Hall, Music Building, New Residence Hall, Norsworthy Hall, and the Recreation Center.
- e. Addition Of Carbon Monoxide Detection To Address Code Compliance Issues In The Following Buildings: Administrative Services Building, Armstrong Hall, Biology Building, Bliss Hall & Annex, Brower Student Center, Centennial Hall, Cromwell Hall, Decker Hall, Hausdoerffer Hall, New Residence Hall, Norsworthy Hall, Packer Hall, Phelps Hall, Power House / Co-Generation, Science Complex, Social Science Building, STEM Building, Townhouse East, Townhouse South, Townhouse West, and Travers & Wolfe Halls.

- f. There Are Other Systems In Various Buildings Connected To Existing FACP'S That Communicate To The Front End LSMS Through The Fire Alarm System. IT Will Be The Contractor's Responsibility To Transfer Those Systems That Are Currently Reporting To The Existing Panels. THERE Are Panels That Monitor Accessory Systems Such As Security, Fire Shutters, Clean/Special Agent Systems, CO Detectors, And Access Control, ETC. CONTRACTOR Shall Survey The Buildings And Include All Additional Accessory Systems And Intermediary Devices Required To Be Integrated In The Shop Drawings.

### 1.3 CONTRACTS

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

### 1.4 CONTRACTORS USE OF PREMISES

- A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The contractor's use of the premises is limited only by the Owner's right to perform work, retain other contractors on portions of associated projects, or to access the building for the occupants.
  - 1. Contractor is to coordinate their work with the activities for each work location.
  - 2. Contractor shall provide for and maintain pedestrian access flow through work areas during the fulfillment of this contract. This work shall include but is not limited to: temporary walkways, protection of open trenches and manholes, safety barriers and signage for pedestrian directions.
- B. Use of the Site: Limit use of the premises to areas required for equipment and material storage -
  - Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas immediately adjacent to the building and areas where the work is being performed.
    - 1. Owner Occupancy: Allow for Owner occupancy and use by the public.
    - 2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials unless previously approved by the owner. Schedule deliveries to minimize space and time requirements or storage of materials and equipment on -site.
    - 3. Burial of Waste Materials: Disposal of organic and hazardous materials on-site either by burial or burning, will not be permitted.
    - 4. Owner will provide designated areas near the construction site for parking for two vehicles, all other vehicles must park at the TCNJ Carlton Avenue parking lot and have the workers shuttled to the site.

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01010



SECTION 01025 – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SCHEDULE OF VALUES

- A. Each Contractor shall prepare a schedule of values in coordination with the preparation of progress schedule. Correlate line items with other administrative schedules and forms required for the work, including progress schedule, payment request form, listing of subcontractors, schedule of allowances if any, schedule of alternates if any, listing of products and principal suppliers and fabricators, and schedule of submittals. Break down principal subcontract amounts into multiple line items for each entity of work. Round off to nearest whole dollar, but with total equal to Contract Sum. Submit 4 copies of schedule of values to the Owner and Architect for review and approval.
  - 1. Upon Owner/Architect approval, Owner will return the Schedule of Values to the Contractor for the Contractor to submit to the bonding company for their acceptance. Payments will not be made to the Contractor until the bonding company has provided a written acceptance to the Owner.
- B. The schedule of values shall be tabulated into subcontracts and trades with the Quantity, Labor, Material, and Total Cost indicated. The Schedule of Values shall include such items as bonds, insurance, allowances and alternates, punchlist/close out documents and shall enclose copies of invoices and/or cancelled checks from bonding and insurance agents.
- C. values shall be submitted on AIA Form G703 or similar form approved by the Architect and Owner.
- D. Each Contractor's monthly application for payment shall be in the same schedule form, reflecting the same items from above. Unit costs shall be realistic for their part of the Work.

1.2 CHANGES IN THE WORK

- A. When a change in the Work includes a category or categories of Work both added to and deducted from the Contract, the total quantities of added Work and of deleted Work shall be determined separately for each category and the appropriate unit price or net cost of the Work shall be applied to the difference between the two total quantities.
- B. Unit prices shall be inclusive of all costs and shall be applied to units of measure as defined in the Specifications for each category of Work.
- C. For all extra Work performed by the Contractor, the gross cost to the Owner shall include the net cost of the Work to the Contractor plus an allowance for overhead and profit not to exceed 15% of the net cost.
- D. For all extra Work performed by a Subcontractor, the gross cost to the Owner shall include the net cost of the Work to the Subcontractor plus an allowance for overhead and profit not to

exceed 15% of the net cost, plus the Prime Contractor's overhead and profit not to exceed 5% of the Subcontractor's cost.

- E. Net cost of extra Work shall be the actual or pro-rated cost of:
1. Labor, including foreman, at the prevailing rate of wages, contributions and taxes.
  2. Materials entering permanently into the Work, including delivery to the site.
  3. The ownership or rental cost of construction equipment and expendable tools, pro-rated for the time necessary for the Work.
  4. Power and consumable supplies for the operation of power equipment, pro-rated for the time necessary for the Work.
  5. Insurance and Bonds.
- F. Gross costs shall be net costs plus the mark up allowances described above, such mark up allowances being inclusive, of all cost of superintendence, supervision, engineering, overhead, profit, administrative and site office expenses and all other general expenses.

### 1.3 APPLICATIONS FOR PAYMENT

- A. Except as otherwise indicated, sequence of progress payments for the Contractor shall be regular, and each shall be consistent with previous applications and payments. It is recognized that certain applications involve extra requirements, including initial applications, applications at times of substantial completion, and final payment applications.
- B. Payment Application Forms: Use AIA Document G702 and G703 Continuation Sheets; available from Publications Distribution Div., The American Institute of Architects, 1735 New York Ave., N.W., Washington, D.C. 20006 (also available at most local AIA chapter offices).
- C. Except as otherwise indicated, complete every entry provided on the form, including notarization and execution by authorized persons. Incomplete applications will be returned by Architect and Owner without action. Entries shall match current data of schedule of values, progress schedules and reports. Listing shall include amounts of fully executed change orders issued prior to first day of the period of construction covered by application. Applications for payment shall include weekly payroll report. Contractor shall furnish to the Owner certified payroll reports for each payroll period with pay request, indicating name craft, social security number and actual hourly rate of wages paid to each workman employed on the project. A certified payroll record is defined as "a payroll record which is attested to by the employer, or corporate officer of such company, or an authorized agent of the employer." A payment request will not be paid until the Owner receives the certified payrolls.
- D. Submit one "pencil" copy of each proposed payment application to the architect and owner, for review, not less than seven days prior to formal submissions of application.
- E. Submit 4 executed copies of each payment application. Transmit with a transmittal form listing attachments, and recording appropriate information related to application.
- F. Breakdown may include a line item for General Conditions. General Conditions shall include the cost of general supervision, trailers, temporary utilities and other general expenses directly



related to the project and not considered overhead. The general conditions item shall be billed on monthly progress payments on a percentage of work completed.

#### 1.4 INITIAL PAYMENT APPLICATION

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

#### 1.5 PROGRESS PAYMENTS

- A. Based upon application for payments submitted to the Architect and the Owner, by the Contractor, on or about the 25th day of each month for the period ending the last day of the previous second month, and Certificate of Payment issued by the Architect and the Owner, the Owner will make progress payments on account of the Contract Sum to the Contractor as follows:
1. On or after the 20th day of each month, the Contractor shall submit to the Architect and Owner a "pencil copy" indicating the previous payment and the proposed amounts for each line item for the current period. After review and approval or changes, the Contractor shall prepare the final billing for presentation to the Architect and Owner.
    - a. Whenever any contract, the total price of which exceeds \$100,000, entered into by a State college, for the construction, reconstruction, alteration or repair of any building, structure, facility or other improvement to real property, requires the withholding of payment of a percentage of the amount of the contract, the contractor may agree to the withholding of payments in the manner prescribed in the contract, or may deposit with the State college registered book bonds, entry municipal bonds, State bonds or other appropriate bonds of the State of New Jersey, or negotiable bearer bonds or notes of any political subdivision of the State, the value of which is equal to the amount necessary to satisfy the amount that otherwise would be withheld pursuant to the terms of the contract. The nature and amount of the bonds or notes to be deposited shall be subject to approval by the State college. For purposes of this section, "value" shall mean par value or current market value, whichever is lower.

If the contractor agrees to the withholding of payments, the amount withheld shall be deposited, with a banking institution or savings and loan association insured by an agency of the Federal government, in an account bearing interest at the rate currently paid by such institutions or associations on time or savings deposits. The amount withheld, or the bonds or notes deposited, and any interest accruing on such bonds or notes, shall be returned to the contractor upon fulfillment of the terms of the contract relating to such withholding. Any interest accruing on cash payments withheld shall be credited to the State college.

- b. Any contract, the total price of which exceeds \$100,000, entered into by a State college involving the construction, reconstruction, alteration, repair or maintenance of any building, structure, facility or other improvement to real property, shall provide for partial payments to be made at least once each month as the work progresses, unless the contractor shall agree to deposit bonds with the State college pursuant to section 1.
  - c. With respect to any contract entered into by a State college pursuant to section 2 for which the contractor shall agree to the withholding of payments pursuant to section 1, 2% of the amount due on each partial payment shall be withheld by the State college pending completion of the contract.
2. Upon acceptance of the work performed pursuant to the contract for which the contractor has agreed to the withholding of payments pursuant to subsection a. of this section, all amounts being withheld by the State college shall be released and paid in full to the contractor within 45 days of the final acceptance date agreed upon by the contractor and the State college, without further withholding of any amounts for any purpose whatsoever, provided that the contract has been completed as indicated. If the State college requires maintenance security after acceptance of the work performed pursuant to the contract, such security shall be obtained in the form of a maintenance bond. The maintenance bond shall be no longer than two years and shall be no more than 100% of the project costs.
- a. This act shall take effect immediately. This bill supplements the “State College Contracts Law,” P.L.1986, c.43 (C.18A:64-52 et seq.), and applies to any State college contract for over \$100,000 which involves the construction, reconstruction, alteration or repair of any building, structure, facility or other improvement to real property. Under the provisions of this bill, whenever a contract of this type requires the withholding of payment of a percentage of the amount of the contract, the contractor would have the choice of either agreeing to a retainage deduction from each monthly progress payment, or the contractor could choose to deposit bonds in the amount necessary to satisfy the amount that otherwise would be withheld under the contract. If a contractor chooses a retainage deduction from each monthly payment, then the retainage would be limited to 2% of the amount due on each partial payment. Upon acceptance of the work performed pursuant to the contract for which the contractor has agreed to a retainage deduction, all amounts being withheld by the State college must be paid in full to the contractor within 45 days of the final acceptance date agreed upon by the contractor and the State college. The

bill provides that if the State college requires maintenance security after acceptance of the work performed under the contract, the security must be obtained in the form of a maintenance bond, which is required to be no longer than two years and no more than 100% of the project costs. The provisions of this bill are similar to provisions in the "Local Public Contracts Law," P.L.1971, c.198 (C.40A:11-1 et seq.) and the "Public School Contracts Law," P.L.1977, c.114 (C.18A:18A-1 47 et seq.).

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

#### 1.6 APPLICATION AT TIME OF SUBSTANTIAL COMPLETION

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

#### 1.7 FINAL PAYMENT APPLICATION

- A. The administrative actions and submittals which shall precede or coincide with submittal of the Contractor's final payment application can be summarized as follows, but not necessarily by way of limitation.
  1. Completion of project closeout requirements.

2. Completion of items specified for completion beyond time of substantial completion, regardless of whether special payment application was previously made.
3. Assurance, satisfactory to Owner and Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
4. Transmittal of required project construction records to Owner via the Owner.
5. Proof, satisfactory to Owner and Owner, that taxes, fees and similar obligations of Contractor have been paid.
6. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.
7. Notarized consent of surety for final payment.

#### 1.8 WAIVER OF LIENS

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

END OF SECTION 01025

SECTION 01100 - PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SPECIAL REQUIREMENTS

- A. **Schedule:** Contractor shall provide a master schedule showing sequencing of work utilizing the CPM method. The Contractor shall supply a schedule with all subcontractor activities, relationships, and durations, utilizing the CPM method via SureTrak/Primavera, Version 3.0, or a Microsoft scheduling software to the Owner on a working version CDrom and coordinate their schedule with the Owner.
1. The Contractor is required to update at the end of each month the CPM Schedule based on the percentage completed for each activity on the approved schedule (in concert with the submission of the percentage completed in the monthly proposed schedule of values).
  2. **The contractor in their bid includes a cost of \$500.00 per month for this schedule submission, for the duration of construction (per the milestone schedule in the bidding documents). This only applies to projects in excess of 2 million dollars in base price price. The contractors schedule of values shall include this cost, and can only be billed for upon TCNJ's successful receipt of said schedule. Should any schedule not be received at the end of any month during construction, TCNJ will issue a deduct change order in the amount of \$500.00 to the contractor.**
- B. Each Contractor shall take all necessary precautions to ensure the safety of all structural elements during all phases of all work. No materials, cranes, trucks or any other construction loads shall be placed on any part of the structure until the Contractor has determined the adequacy of that structure to carry the intended load without damage or overstress.
- C. Entrance into, or other use of the building will not be permitted except as may be necessary for the execution of the Work, and shall be subject to the restrictions and instructions of the Owner.
1. **NOTE: Any personnel working in any residence hall, including delivery personnel are to have a State Police Background check completed before entering any residence hall. Contractor is to provide the background check for all personnel at the kick off meeting, and/or prior to start of their work. Should a person not have a background check but is on site for a short period of time, said person shall be escorted by a TCNJ project manager/superintendent and /or a designated person that has provided the appropriate back ground check information. All back ground checks will be forwarded to TCNJ police for review and filing.**
  2. **NOTE: any personnel working in a residence hall must wear a badge with the name of the vendor/contractor they work for and their personal name. This badge must be worn at all times.**
- D. Routes of ingress and egress to areas where work is being performed shall be subject to the restrictions and instructions of the Owner.

- E. Materials shall be moved through the Building using rubber tired vehicles which shall be properly controlled at all times to avoid damage to existing wall, floor or ceiling surfaces.
- F. Water damage cannot be tolerated and it is incumbent upon Contractors to take any steps necessary to keep the existing premises dry at all times.
- G. Any damage to the new building from heavy equipment, striking the Building or any other damage to any part of the premises shall be repaired at the expense of the Contractors.
- H. All welding and cutting shall be performed by qualified and certified welders. Certificates shall be on file with the Contractor prior to commencement of any welding.
- I. No work shall start before 8:30am unless agreed to in advance with the College.

PART 2 - PRODUCTS  
NOT APPLICABLE

PART 3 - EXECUTION

3.1 GENERAL

- A. Contractors shall perform the work on or about the premises in a careful manner with full consideration to fire protection as required by the National Fire Protection Association Standards, National Board of Fire Underwriters and State and Local Departments having jurisdiction. Fire resistant materials shall be used for temporary enclosures.
- B. Chemical extinguishers approved by the Owner shall be provided by the Contractor during the progress of the work where and as required by the Owner, the Local Fire Marshal and the National Board of Fire Underwriters.
- C. The Contractor shall maintain an active program of fire prevention to keep workmen fire conscious during the entire life of the Contract. Designate one member of the organization to execute and coordinate fire control measures of his own organization and that of all subcontractors under his jurisdiction.
- D. All sub-contractors shall cooperate with the Contractor in carrying out the above program.
- E. Storage of flammable materials will not be permitted in the Building unless written permission is obtained from the Owner. Storage of all such materials shall be the Contractors' responsibility.
- F. On-site open burning of rubbish, garbage, trade waste, leaves or plant life is prohibited.
- G. Safety Program: The Contractor shall institute a safety program in accordance with OSHA and any local, state, or federal guidelines. The contractor shall name a safety officer to monitor this program and shall submit a safety report at job meetings.

- H. Stockpiling: Stockpiling of materials on site will be allowed (but limited due to the limited space on this site). Such materials shall not impair or impede the functioning of the facility. Materials stored on site shall be secured to prevent loss from theft, damage, vandalism or fire. By stockpiling materials on site, the contractor assumes full responsibility for said materials, and shall protect them to the fullest extent possible. Specific locations for stockpiling materials shall be coordinated with the Owner.
1. NOTE: Excess soil shall be removed from the site and disposed of immediately as part of this project. The intent is to minimize the quantity of open trenches and stock piled soils at the site.
- I. Safety Barriers: The Contractor shall erect safety barriers to deter and prohibit unauthorized access to the construction site; such barriers may take the form of fences and shall be clearly marked with signage prohibiting unauthorized access. The Contractor shall be responsible for safety barriers around the site and within the buildings. The contractor shall be liable for damages to persons or property due to the construction process if adequate safety measures are not undertaken. The Owner shall review safety precautions for their adequacy but shall not be held liable for Contractors failure to maintain or provide adequate protection.
- J. Sequencing: The Contractor will work with the Sub-Contractors to sequence the work during the submission of monthly project schedules. Contractors shall endeavor to coordinate their work efforts with the Owner's requirements. Interruptions of utility services shall be coordinated with the Owner, but in no instance, shall last longer than 2 hours.
- K. Limited staging and on site parking will be provided by General Contractor. The Contractor will coordinate parking areas with all the subcontractors and TCNJ.
1. Parking will be available at Carlton Avenue. Contractor will provide shuttle service to and from the site.
  2. Contractor will be permitted to have vehicles on site with in the construction fencing only. Contractor is to provide stone in all parking areas on site to prevent the buildup of ruts and mud, thus minimizing the amount of mud leaving the site and being left behind on TCNJ roads.
- L. Site Utilities: Electric power and water are available on site. Toilet facilities will be made available by the Contractor. These facilities shall remain clean by the Contractors throughout the course of the project. The Contractors shall repair and/or replace any damaged fixtures, partitions, etc. The Electrical Sub-Contractor shall tie in a temporary power panel (or panels as required) for all trades to use during construction. Interruption of building services shall not occur without prior consent and coordination by the Owner and Owner.
1. Provide portable toilets for all construction personnel.
- M. Construction Lighting: The Electrical Sub-Contractor shall run sufficient strings and fixtures to maintain a 50 foot-candle/sq.ft.intensity of light throughout the project areas.
- N. Dumpster Location and Cleanup: The Owner shall coordinate the dumpster location with the Contractors. The Contractor shall be responsible for obtaining, maintaining, and disposing of dumpsters, and shall maintain clean work areas throughout the course of the project.

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

### 3.2 PROGRESS MEETINGS

- A. Progress Meetings shall be held bi-weekly at the job site at a regular time and day mutually agreed upon. The frequency may be changed by the Engineer or Owner to reflect current conditions. The Contractors, those of his/their subcontractors concerned with current progress or with scheduling of future progress, the Engineer, and the Owner shall each be represented at these job meetings by persons familiar with the details of the work and authorized to conclude matters relative to work progress, establishment of progress schedules, etc., as may be necessary to expedite completion of the work.
- B. The Contractors and his/their subcontractors attending these meetings shall present complete and definite reports as to the status of their respective work, conditions of product and equipment manufacturer, labor availability, productivity and cooperation, shipping data, time of completion, sequence of the work, safety program, and any other information bearing upon the execution of the Contract or subcontract. For the Owner's convenience the Owner will chair the meetings.

### 3.3 MONTHLY REPORTS

- A. The Contractor is to provide TCNJ a brief monthly status report on the last working day of each month dividing the status of the project into the following categories (report must be complete in all respects, piece meal submissions will not be accepted):
  1. Project overview
  2. Financial status
  3. Updated project schedule
  4. Change order request log
  5. Submittal log
  6. RFI log
  7. Owner/Engineer issues that need immediate resolution
  8. Order/delivery issues
- B. The Contractor is to provide TCNJ with this monthly report, and include in their bid a cost of \$500.00 per month for all projects in excess of 2 million dollars base bid price for the duration of the construction period as noted in the bidding milestone schedule. This total cost will be listed in the contractor's schedule of values and can be billed for on a monthly basis only if said



report is received in whole as noted above. Should TCNJ not receive said complete report a deduct change order will be issued to the contractor for \$500.00 for that month.

END OF SECTION 01100



## SECTION 01300 – SUBMITTALS AND SUBSTITUTIONS

### PART 1 - GENERAL

#### 1.1 PROGRESS SCHEDULE / COORDINATION DRAWINGS

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

#### 1.2 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop drawings, product data and samples will not be processed by the Owner and/or Engineer until the list of subcontractors, material suppliers and fabricators is submitted as required under Paragraph 3.12 of the General Conditions.
  - 1. The successful Contractor shall submit their list of proposed substitutions with in 20 calendar days of the Contract Award.
  - 2. The Engineer shall be compensated on an hourly basis for review of all shop drawings or samples that do not meet the requirements of the contract documents after two submissions. The compensation shall be deducted from the contractors contract via a deduct change order, or other means that both parties agree to.
- B. Coordinate preparation and processing of submittals with performance of the work so that work will not be delayed by submittals. Allow two weeks for review/approval by the Engineer for

the approval process, one additional week for TCNJ staff to review the submittal before it is returned to the contractor. Allow additional time if processing must be delayed to permit coordination with subsequent submittals with others.

1. Contractor is to provide a submittal schedule identifying the critical path submittals to assist the design team in prioritizing their review and subsequent return to the contractor prior to the first requisition for payment being processed. Every submittal is to have a required return date associated with it so the design team can schedule their reviews accordingly.
- C. Provide permanent marking on each submittal to identify Project, date, Contractor, subcontractor, submittal name, Specification section, drawing reference, and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space (5" x 7") for Engineer's Action marking and space for Owner's review marking. Package each submittal appropriately for transmittal and handling. Submittals received, which are lacking the above information, will be returned without action. Submittals, which are received from sources other than through Contractor's office, will be returned without action.
- D. Each submission shall be complete, with all options clearly marked and with all components required for the assembly fully described and detailed. Submissions missing important information will be returned unchecked.
- E. Transmittal Form: Submittals shall be accompanied by a transmittal form. Provide Contractor's certification on form, ready for execution, stating that information submitted complies with requirements of contract documents.
- F. Transmit all submittals and shop drawings to the Engineer with a copy of the transmittal to the Owner.
- G. Except as otherwise indicated in individual work sections, comply with requirements specified herein for each indicated category of submittal. Provide and process intermediate submittals, where required between initial and final, similar to initial submittals.
- H. Do not proceed with installation of materials, products or systems until final copy of applicable shop drawings, product data and samples are in possession of Installer.
- I. Provide newly prepared shop drawings, on reproducible sheets, with graphic information at accurate scale, with company name of preparer indicated. Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards, and special coordination requirements. Do not allow shop drawing copies without appropriate final Action markings by Engineer to be used in connection with the work.
1. Initial and Intermediate Submittals: One correctable translucent reproducible print and 5 blue line or black line prints; reproducible will be returned.
  2. Final Submittal: 6 prints, plus 3 additional prints where required for maintenance manuals; 4 will be retained and remainder will be returned, one of which shall be marked up and maintained by Contractor as "Record Document".

3. Electronic submittals are acceptable in AutoCad format only. Contractor shall be responsible for printing and distribution of multiple copies as required.
- J. Collect required product data into one submittal for each unit of work or system; and mark each copy to show which choices and options are applicable to the project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements that have been checked, and special coordination requirements. Maintain one set of product data for each submittal at project site, available for reference by Engineer and others.
- K. Submittals will be accepted from the Contractor only. Submittals received from other entities will be returned without review or action.
1. Submittals received without a transmittal form will be returned without review or action.
  2. Transmittal form: Use a form matching the sample form attached to this section. Include the following:
    - a. List of deviations.
    - b. The Contractor's certification signature.
  3. Fill out a separate transmittal form for each submittal; also include the following:
    - a. Other relevant information.
    - b. Request for additional information.
- L. Do not submit product data, or allow its use on the project, until compliance with requirements of Contract Documents has been confirmed by Contractor. Submittal is for information and record unless otherwise indicated. Initial submittal is final submittal unless returned promptly by Engineer marked with an Action that indicates and observed noncompliance. Submit 6 copies, plus 3 additional copies, which will be returned, where required for maintenance manuals.
1. Electronic submittals are acceptable in 8 ½" x 11" format only.
- M. Upon receipt of a signed copy of the Engineers' Waiver form, electronic copies of CAD drawings of the Contract Documents will be provided by the Engineer for Contractor's use in preparing submittals.
- N. Product Selection Procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the named product or an equivalent.
  2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product of the manufacturer or source that complies with requirements, or an equivalent.
  3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the

products listed that complies with requirements, or an equivalent. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.

4. Manufacturers: Where specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed, or an equivalent, that complies with requirements. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.
5. Product Options: Where Specification paragraphs or subparagraphs refer to "Product Options and Substitutions," indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system; provide the specific product or system or an equivalent product or system by another manufacturer. Comply with provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.
6. Basis of Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Products" introduce or refer to a list of manufacturers' names, provide either the specified product or an equivalent. Drawings and Specifications indicate sizes, profiles, dimensions and other characteristics that are based on the product names. Comply with the provisions of "Product Options and Substitutions," Section 1.4 of Division 1300 of these specifications when submitting an equivalent product.

### 1.3 MISCELLANEOUS SUBMITTALS

- A. Miscellaneous submittals related directly to the work include warranties, maintenance agreements, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the work and not processed as shop drawings, product data or samples.
- B. Refer to sections for specific general requirements on warranties, product/workmanship bonds, and maintenance agreements. In addition to copies desired for Contractor's use, furnish 2 executed copies, except furnish 3 additional copies where required for maintenance manuals.
- C. For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

### 1.4 PRODUCT OPTIONS AND SUBSTITUTIONS

#### A. DEFINITIONS

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

- a. **Named Products:** Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - b. **New Products:** Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
  - c. **Equivalent Product:** Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
2. **Substitutions:** Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  3. **Basis-of-Design Product Specification:** Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
  4. **Manufacturer's Warranty:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  5. **Special Warranty:** Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
  6. **Buy American Requirement: the Contractor shall comply with N.J.S.A 52:32-1 and N.J.S.A. 52:33-1 et seq., which prohibits the use by the Contractor or subcontractors of materials or farm products produced and manufactured outside of the United States on any public work.**
- B. **General Requirements:**
1. The requirements for substitutions do not apply to specified Contractor options on products and construction methods. Revisions to Contract Documents, where requested by Owner or Engineer are changes, not substitutions. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute substitutions and do not constitute a basis for change orders. Otherwise, Contractor's requests for changes in products, materials, and methods of construction required by Contract Documents are considered requests for substitutions, and are subject to requirements hereto.
  2. To the greatest extent possible, provide products, materials and equipment of a singular generic kind and from a single source.

3. Where more than one choice is available as options for Contractor's selection of a product or material, select an option that is compatible with other products and materials already selected. Total compatibility among options is not assured by limitations within Contract Documents, but shall be provided by Contractor. Compatibility is a basic general requirement of product/material selections.
  4. Any and all contractor substitutions that require additional work by other trades not specifically called for in the documents shall be paid for by the contractor requesting the substitution if any other trade increase is required.
  5. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- C. Submittals: Submit 6 copies, utilizing Substitution Request Form, CSI Form 13.1.A, fully identified for product or method being requested for substitution, including related specification section and drawing numbers, and fully documented to show compliance with requirements for substitutions. Include product data/drawings, description of methods, samples where applicable, Contractor's details comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work and contractors, cost information or proposal, warranty information, compatibility with other work, approval of all authorities having jurisdiction, and Contractor's statement to the effect that proposed substitution will result in overall work equal to or better than work originally indicated.
- D. Contractor's options for selecting products are limited by Contract Documents requirements, and governing regulations. Required procedures include, but are not necessarily limited to, the following for various indicated methods or specifying:
1. Single product/manufacture name; provide product indicated or equivalent, except advise Engineer before proceeding, where known that named product is not a feasible or acceptable selection.
  2. Two or more product/manufacture names; provide one of the named products or equivalent, at Contractor's option; but excluding products which do not comply with requirements. Advise Engineer before proceeding.
  3. Equivalent; where named products in Specifications text are accompanied by the term "or equivalent", or other language of similar effect, comply with those Contract Documents provisions concerning substitutions for obtaining Engineer's approval of equivalent product.
  4. Named, except as otherwise indicated, is defined to mean manufacturer's name for product, as recorded in published product literature, of latest issue as of date of Contract Documents. Refer requests to use products of a later or earlier model to Engineer for acceptance before proceeding.
  5. Where compliance with an imposed standard, code or regulation is required, selection from among products that comply with requirements including those standards, codes and regulations, is Contractor's option.



6. Provide products which comply with specific performances indicated, and which are recommended by manufacturer, in published product literature or by individual certification, for application indicated. Overall performance of a product is implied where product is specified for specific performance.
  7. Provide products that have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for mixing, fabricating, curing, finishing, testing and similar operations in manufacturing process.
  8. Where specified product requirements include "...as selected from manufacturer's full range of colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic product data is to comply with requirements of the Contract, and selection shall be from the full range of products within the requirements. Where specified product requirements include "... as the industry...", or words to that effect, selection of product complying with requirements, is Engineer's selection, including designation of manufacturer, where necessary to obtain desired color, pattern or texture.
- E. Substitutions may be permitted by the Engineer, if, in his opinion, the requirements of the proposed substitution comply with the requirements specified for the material, article or piece of equipment; however, the Engineer is not required to permit substitution pursuant to the case of Whitten Corporation vs. Paddock, Incorporated, United States District Court, Massachusetts, April 12, 1974, affirmed by the Federal First Circuit Court, December 14, 1974.
- F. After award of contract, the Contractor may submit substitutes to the Engineer for review, fully documented and certified, and accompanied by a proposal for a reduction in the Contract Sum.
- G. Contractor's request for substitution will be received and considered when extensive revisions to Contract Documents are not required and changes are in keeping with general intent of Contract Documents; when timely, fully documented and properly submitted; and when one or more of following conditions is satisfied, all as judged by Engineer. Otherwise, requests will be returned without action except to record noncompliance with these requirements.
1. Where request is directly related to an "equivalent" clause or other language of same effect in Contract Documents.
  2. Where required product, material or method cannot be provided within Contract Time, but not as a result of Contractor's failure to pursue the work promptly or coordinate various activities properly.
  3. Where required product, material or method cannot be provided in a manner which is compatible with other materials of the work, or cannot be properly coordinated therewith, or cannot be warranted (guaranteed) as required, or cannot be used without adversely affecting Owner's insurance coverage on completed work, or will encounter other substantial noncompliances which are not possible to otherwise overcome except by making requested substitution, which Contractor thereby certifies to overcome such incompatibility, uncoordination, nonwarranty, noninsurability or other noncompliance as claimed.
  4. Where substantial advantage is offered Owner, in terms of cost, time or other valuable considerations, after deducting offsetting responsibilities Owner may be required to

bear, including additional compensation to Engineer for redesign and evaluation services, increased cost of other work by Owner or separate Contractors, and similar considerations.

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

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

#### 1.6 EQUIVALENT PRODUCTS

- A. Where products or manufacturers are specified by name, Contractor must submit the following, in addition to other required submittals, to obtain approval of an unnamed product proposed as an equivalent:
  - 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those named in the specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
  - 5. Samples, if requested.

#### 1.7 OPERATION AND MAINTENANCE INSTRUCTIONS AND EQUIPMENT WARRANTIES

- A. The Contractor shall orient and instruct the responsible maintenance personnel designated by the Owner in the Operation of all equipment and shall provide the maintenance personnel with pertinent literature and operational manuals for all equipment. Date and time of demonstrations shall be mutually agreed upon with the Owner. Provide qualified personnel for

as long as necessary to fully orient and instruct the Owner. Contractor shall videotape instruction session and provide owner with completed video.

- B. The manuals shall be submitted in (quadruplicate) 3-ring loose-leaf type binders to the Engineer for approval with all additional information that the Engineer may request and considers necessary for the proper servicing and maintenance of all equipment. Manuals are to include plain paper copies of approved shop drawings and catalog cuts. The quality of the copies may be subject to approval by the Engineer. Upon completion and approval, 3 copies will be forwarded to the Owner and one copy retained by the Engineer.
- C. Manuals shall include no less than the following:
  - 1. Maintenance Schedule: Typewritten schedule describing manufacturer's recommended schedule of maintenance and maintenance procedures.
  - 2. Catalog cuts and shop drawings:
    - a. Catalog cuts shall clearly indicate the exact model and type of each piece of equipment installed in the Project, including all options provided.
    - b. Catalog cuts shall fully describe equipment including physical, electrical, mechanical and other characteristics, performance characteristics and installation or erection diagrams.
    - c. Catalog cuts shall indicate spare part numbers and name, address and telephone number of local representative or service department.
  - 3. Typewritten list of all subcontractors on the Project including name, address, telephone number and responsibility on the Project.
  - 4. Manuals shall be indexed with dividers indicating each system or piece of equipment.
  - 5. Warranties, permits, inspection stickers/approvals and Certificate of Occupancy are to be included.
- D. Required warranties shall be submitted in three copies to the Engineer.
- E. The Contractor shall video tape all instructional sessions and demonstrations and provide the Owner with a copy of the videotape at the end of all demonstrations.

PART 2 - PRODUCTS  
NOT APPLICABLE

### PART 3 - EXECUTION

#### 3.1 ACTION ON SUBMITTALS

- A. One copy of all submissions will be returned to the Contractor for his files. The Contractor shall mark up other copies so as to conform with the copy returned to him and forward them to all interested Contractors, Subcontractors, and Suppliers.
- B. The Engineer will review and stamp submitted shop drawings in one of the following ways (the actual stamp may be different; below language is shown for an example only)
  - 1. "No Exceptions Taken": Approved.
  - 2. "Make Corrections Noted": Approved, provided the work complies with corrections marked on the submittal.
  - 3. "Revise and Resubmit": Do not commence work of this submittal. Revise and resubmit or prepare a new submittal; comply with notations marked on submittal.
  - 4. "Rejected": Fundamentally not in compliance. Prepare a new submittal. No notations or comments made.
- C. Work shall be executed in accordance with "Approved", "Approved As Noted", or "Resubmit for Record" stamp only.
- D. Engineer's review of shop drawings/submittals will constitute checking for general arrangement only, and shall not relieve the Contractor of responsibility for complete compliance with Drawings and Specifications. Contractor shall be responsible for quantities and dimensions to assure a proper fit under field conditions.

#### 3.2 DISTRIBUTION

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

#### 3.3 COLOR SELECTIONS

- A. All colors for all finished surfaces and materials will be approved by the Owner. The color selections will be made at **one time** to provide a complete and coordinated color schedule which, upon acceptance of the Owner, will be provided to the Contractor. Any and all specific color selections for materials not noted on drawings or in specification shall be chosen by Owner after submittal of samples.
- B. The Contractors are reminded of the requirement to declare all substitutions within 20 days of execution of their Contract as specified.

END OF SECTION 01300



## SECTION 01310 - QUALITY CONTROL

### PART 1 - GENERAL

#### 1.1 TRADESMEN AND WORKMANSHIP

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

#### 1.2 INSPECTION, TESTS AND REPORTS

- A. Required inspection and testing services are intended to assist in determination of probable compliances of the work with requirements, but do not relieve any Contractor of responsibility for those compliances, or for general fulfillment of requirements of Contract Documents. Specified inspections and tests are not intended to limit any Contractor's quality control program. Afford reasonable access to agencies performing tests and inspections.
- B. Contractors are responsible for all testing associated with their work (soils compaction, concrete, etc.) and shall submit the name of their proposed testing agency within 15 days of Notice-to-Proceed. Contractor is responsible to coordinate the activities of the testing agency to assure that work is tested prior to being covered up or other activities associated to the work begin.

### PART 2 - PRODUCTS NOT APPLICABLE

### PART 3 - EXECUTION

#### 3.1 REPLACEMENT OF WORK

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

#### 3.2 EXAMINATION

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

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

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

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

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

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - a. Description of the Work.
  - b. List of detrimental conditions, including substrates.
  - c. List of unacceptable installation tolerances.
  - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for communication systems to verify actual locations of connections before equipment and fixture installation.



4. Examine walls, and floors for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.3 PREPARATION

- A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  1. Notify Owner not less than two days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without Owner's/Owner's written permission.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.4 CONSTRUCTION LAYOUT

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

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Only use the best quality tools and equipment with proper attenuations for the latest acceptable sound levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  - 1. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

END OF SECTION 01310

## SECTION 01320 - TEMPORARY FACILITIES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION OF REQUIREMENTS

- A. Specific administrative and procedural minimum actions are specified in this section, as extensions of provisions in General Conditions and other Contract Documents. Nothing in this section is intended to limit types and amounts of temporary work required, and no omission from this section will be recognized as an indication that such temporary activity is not required for successful completion of the work and compliance with requirements of Contract Documents.
- B. Contractor is specifically assigned certain responsibilities for temporary facilities to be used by all Contractors, other entities at the site, the Owner's work forces and other personnel including occupants of the project, the Owner, the Engineer, test agencies, personnel of governing authorities, and similar entities and personnel authorized to be at the project site during construction. In general, the Contractor is assigned the responsibilities for installation, operation and removal of each temporary facility; and, except as otherwise indicated, is responsible for costs and use charges associated therewith, including fuel, power usage, water usage and similar usage costs.
- C. No costs or usage charges for temporary facilities are chargeable to the Owner, nor can any Contractor's cost or usage charges for temporary facilities be accepted as the basis for a change order extra. The total costs and usage charges for temporary facilities are included, collectively, in the Contract Amounts.

#### 1.2 GENERAL REQUIREMENTS

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

#### 1.3 JOB CONDITIONS

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

1.4 ENVIRONMENTAL PROTECTION

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

1.5 SECURITY

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

1.6 TEMPORARY CONSTRUCTION FACILITIES

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

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

- A. The Contractor shall be responsible for daily cleaning up of spillages and debris resulting from his operations and from those of his Subcontractors; and shall be responsible for complete removal and disposition of hazardous and toxic waste materials. The Contractor shall provide containers at grade, sufficient for the depositing of nonhazardous/nontoxic waste materials, and shall remove such waste materials from project site at least weekly during cold weather (daily high temperatures below 50°F) and at least twice weekly during mild and warm weather.
  - 1. Contractor is responsible to provide and pay for all dumpsters.
- B. The Contractor shall daily clean all mud, dirt and debris resulting from all trades operations from the adjacent streets, sidewalks, drives and parking areas and shall repair all damage caused by the cleaning to the satisfaction of the Owner.

- C. The Contractor is to provide and maintain appropriate means of trash disposal (i.e., chutes) to grade/dumpster. Multiple units may be required and shall be figured for in the bid.

## PART 2 - EXECUTION

### 2.1 ENCLOSURES

- A. At earliest possible date, the Contractor shall secure project area against unauthorized entrance at times when personnel are not working. Provide secure temporary enclosure at ground floor and other locations of possible entry, with locked entrances.
- B. Where any form of demolition will expose the interior of the building to weather, demolition shall follow the erection of weatherproof walls by the Contractor installed inside the demolition line, sealed and flashed, as required, to keep all water from the building interior. Keep temporary weatherproofing in place until new construction has been completed to the stage where water will not enter the building.
- C. The Contractor shall provide constant protection against rain, wind, storms, frost or heat to maintain the work, materials, apparatus and fixtures free from damage. At the end of each day's work, cover work likely to be damaged. During cold weather, protect work from damage by freezing and provide such enclosures and heating apparatus as may be necessary diligently to prosecute the Work without stoppage for reason of unfavorable weather.
- D. Wherever a Contractor provides openings through walls or slabs, each location shall be adequately protected at the end of each working day with temporary enclosures to make these areas tight. Openings through exterior walls shall be watertight.
- E. Install an 8 foot high fence around the area of work pertaining to site work with wind screening. Provide gates as needed to properly access the area to complete the work. Remove the fence once the project is substantially completed. Fence is to have poles into the ground where the fence will be untouched per a period of time, and can have feet with sand bags in areas that the fence may have to be moved occasionally to not interfere with the work.
- F. For renovation projects: Contractor is to maintain the building in a water tight condition during all construction activities by whatever means necessary. Contractor is to never do any more removal work during any given day than that contractor can replace in the same day in order to make sure the occupants of the building will be protected from the possibility of water leakage into the building. Should any leakage occur, the contractor is to immediately make the building water tight (on a 24 hour basis) and repair any damage caused by the leakage or replace any equipment damaged by the leakage.

### 2.2 TEMPORARY ELECTRICITY

- A. Power is available on site.

2.3 TEMPORARY VENTILATION

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

2.4 TEMPORARY TELEPHONES

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

2.5 TEMPORARY WATER

- A. Water is available on site.

2.6 TEMPORARY SANITARY FACILITIES

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

2.7 REMOVAL AND RESTORATION

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

2.8 OWNER'S RIGHTS

- A. If any Contractor fails to carry out his responsibilities in providing temporary facilities, as set forth above, the Owner shall have the right to take such action as he deems proper for the protection and conduct of the Work, and to deduct the cost thereof from the amount due the Contractor at fault.
- B. Extended work days, hours, shifts, weekend work, etc. may be allowed upon coordination and approval by Engineer, Owner at no additional cost to the Owner.
  - 1. Should the schedule begin to slip, for any reason, each contractor will be required to work additional shifts or weekends to recover the lost time. Should there be a cost to the College for this overtime work, the contractor will be required to reimburse the owner for said costs.

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

END OF SECTION 01320





SECTION 01322 – PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. A. This Section includes administrative and procedural requirements for the following work by the Contractor:
  - 1. Preconstruction videos and photographs.
  - 2. Videos and photographs of various stages of construction.
- B. Related Sections include the following:
  - 1. All of Division 1.

1.3 SUBMITTALS

- A. Qualification Data: For photographer.
- B. Media : submit 3 copies on CD or flash drives.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of photographer.
    - c. Name of Engineer.
    - d. Name of Contractor.
    - e. Date video was recorded or photographs taken.
    - f. Description of vantage point, indicating location, direction (by encompass point), and elevation or story of construction.

1.4 QUALITY ASSURANCE

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

1.5 COORDINATION

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

1.6 USAGE RIGHTS

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

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital format : provided on CD or Flash drive in MP4 or AVI format.

PART 3 - EXECUTION

3.1 CONSTRUCTION RECORDINGS AND PHOTOGRAPHS

- A. Digital Photographer: Engage a qualified commercial videographer to record construction videos.
- B. Preconstruction: Before starting demolition or construction record, record Project site, interior and exterior.
  - 1. Show protection efforts / measures put in place by the Contractor.
- C. Photographs: Take photographs of various stages of pre-construction and construction activities.

END OF SECTION 01322

SECTION 01330 – CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 DEFINITION

- A. Closeout is hereby defined to include general requirements near end of Contract Time, in preparation for final acceptance, final payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Divisions 2 through 32. Time of closeout is directly related to Substantial Completion, and therefore may be either a single time period for entire work or a series of time periods for individual parts of the work which have been certified as substantially complete at different dates. That time variation, if any, shall be applicable to other provisions of this section.
- B. Substantial completion shall be defined that every material item has been installed. Nothing is missing and therefore, the punch list can begin.

1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. Prior to requesting the Engineer's inspection for certification of substantial completion, for either entire work or portions thereof, complete the following and list known exceptions in request:
  - 1. In progress payment request coincident with or first following date claimed, show either 100% completion for portion of work claimed as substantially complete, or list incomplete items, value of incomplete items, and reasons for being incomplete.
  - 2. Include supporting documentation for completion as indicated in these Contract Documents.
    - a. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 3. Submit statement showing accounting of changes to the Contract Sum.
  - 4. Advise Owner of pending insurance change over requirements.
  - 5. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.
  - 6. Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including occupancy permits, operating certificates, and similar releases.
  - 7. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner obtaining a signed receipt of materials delivered. Refer to individual work sections for required quantities of spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
  - 8. Discontinue, or change over, and remove from project site temporary facilities and services, along with construction tools and facilities, and similar elements.

9. Complete final clean up requirements.
  10. Touch up and otherwise repair and restore marred exposed finishes.
  11. Inspection: Submit a written request for inspection for Substantial Completion to Owner. On receipt of request, Owner and Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection, the Owner will notify Contractor of items, either on Contractor's list or additional items identified by Engineer that must be completed or corrected before certificate will be issued.
    - a. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
    - b. Results of completed inspection will form the basis of requirements for Final Completion.
- B. Upon receipt of Contractor's request, the Owner and Engineer will proceed with substantial completion inspection. Following inspection, the Engineer will either prepare the certificate of substantial completion, or advise the Contractor of work which shall be performed prior to issuance of certificate. The work remaining to be performed shall be completed prior to the punch list for final acceptance.
- C. Upon receipt of Contractor's notice that work has been completed, including all punch list items, but excepting incomplete items delayed because of circumstances acceptable to the Owner and Engineer, the Owner and Engineer will reinspect the work. Upon completion of reinspection, the Engineer will either prepare the certificate of final acceptance or advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance.
- D. In the event that the work is not completed or obligations are not fulfilled as required for final acceptance and the Owner / Engineer is required to reinspect the work more often than the two inspections described, the Contractor shall compensate the Engineer at the rate of \$900.00 for each additional site visit required for reinspections. The compensation shall be processed by change order as a deduction to the Contractor's Contract Sum, which amount will be paid to the Engineer by the Owner, through a change order as an addition to the Engineer's Contract Sum.
- E. **Substantial Completion shall be defined for this project that every element of the project/construction and the contract, based on the contract and amended drawings and specification sections, are installed and is deemed complete, less repairs and/or touch up type work that would be generally referred to as punchlist work. If any components inside the buildings, or site work associated with this contract are not installed, the project cannot be deemed substantially completed.**

### 1.3 PREREQUISITES TO FINAL ACCEPTANCE

- A. Prior to requesting Engineer's final inspection for certification of final acceptance and final payment, complete the following and list known exceptions, in request:
1. Submit final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit release of liens for all subcontractors.
  3. Submit Contractor's statement that his final application, as presented, is the final bill and no other claims will be presented.
  4. Submit updated final statement, accounting for additional changes to Contract Sum including change orders and allowances.
  5. Submit certified copy of Engineer's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by Engineer.
  6. Submit one set of record documents, bound copies of maintenance/operating manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
  7. Complete final clean up requirements.
  8. Touch up and otherwise repair and restore marred exposed finishes.
  9. Submit notarized consent of surety to final payment.
  10. Submit final liquidated damages settlement statement, if required, acceptable to the Owner.
  11. Revise and submit evidence of final, continuing insurance coverage complying with insurance requirements.
  12. 10% one year Maintenance Bond.
  13. Underwriter's Certificate or Electrical Sub Code Official's Approval.
  14. Final acceptance by Engineer of record documents
- B. Except as otherwise indicated or requested by Owner/Engineer, remove temporary protection devices and facilities that were installed during course of the work to protect previously completed work during remainder of construction period.

#### 1.4 CLEAN UP

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

#### PART 2 - PRODUCTS NOT APPLICABLE

#### PART 3 - EXECUTION

##### 3.1 CLEANING

- A. Where extra materials of value remaining after completion of associated work have become Owner's property, dispose of these to Owner's best advantage as directed.
- B. After Substantial Completion of the Work, each Contractor shall do the final cleaning of the surfaces of his installations as may be required by the various Specification sections.

- C. After Contractor has cleaned their work, The Contractor shall engage a professional cleaning service to perform final cleaning of the work consisting of cleaning each surface or unit to normal clean condition. Comply with manufacturer's instructions for cleaning operations and chemicals. The following are examples, but not by way of limitation, of cleaning levels required:
1. Remove labels that are not required as permanent labels.
  2. Clean transparent materials, including mirrors and window/door glass, to a polished condition, removing substances that are noticeable as vision obscuring materials. Replace broken glass and damaged transparent materials.
  3. Clean exposed exterior and interior hard surfaced finishes, to a dirt free condition, free of dust, stains, films and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective conditions.
  4. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.
  5. Remove debris and surface dust from limited access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
  6. Vacuum and clean carpeted surfaces and similar soft surfaces.
  7. Clean light fixtures and lamps to function with full efficiency.
  8. Clean and wax or polish all hard floors following manufacturer's instructions.
  9. Clean all window surfaces inside and outside.
  10. Perform final cleaning in, on and around all casework, sinks, toilets fixtures, etc.
  11. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
  12. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
  13. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  14. Remove tools, construction equipment, machinery, and surplus material from Project site.
  15. Remove snow and ice to provide safe access to building.
  16. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  17. Sweep concrete floors broom clean.
  18. Replace parts subject to unusual operating conditions.
  19. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  20. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  21. Clean ducts, blowers, and coils if units were operated without filters during construction.
  22. Leave Project clean and ready for occupancy.

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

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

3.3 REMOVE TEMPORARY FACILITIES

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

END OF SECTION 01330





SECTION 01340 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 SUBMITTALS

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

1. Record drawings: Submit in form of opaque prints.
  - a. Sets shall include all drawings, whether changed or not.
2. Other record documents: Submit originals or good quality photocopies.
3. Contractor is responsible for a complete set of record documents and record drawings.

PART 2 - PRODUCTS  
(NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE OF PROJECT RECORD DOCUMENTS

- A. Do not use record documents of any type for construction purposes.
- B. Maintain record documents in a secure location at the site while providing for access by the contractor and the architect during normal working hours; store in a fire-resistive room or container outside of normal working hours.
- C. Record information as soon as possible after it is obtained.
- D. Assign a person or persons responsible for maintaining record documents.
- E. Record the following types of information on all applicable record documents:
  1. Dimensional changes.
  2. New and revised details.

3. Revisions to electrical circuits.
4. Locations of utilities concealed in construction.
5. Particulars on concealed products which will not be easy to identify later.
6. Changes made by modifications to the contract; note identification numbers if applicable.
7. New information which may be useful to the owner, but which was not shown in either the contract documents or submittals.

### 3.2 RECORD DRAWINGS

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

### 3.3 RECORD PROJECT MANUAL

- A. Maintain a complete copy of the project manual, marked to show changes.
- B. Where the actual work differs from that shown in the project manual, mark the record copy to show the actual work.
  1. Include a copy of each addendum and modification to the contract.
  2. In addition to the types of information required on all record documents, record the following types of information:
    - a. Product options taken, when the specification allows more than one.

- b. Proprietary name and model number of actual products furnished, for each product, material, and item of equipment specified.
- c. Name of the supplier and installer, for each product for which neither a product data submittal nor a maintenance data submittal was specified.

3.4 TRANSMITTAL TO OWNER (through the Engineer)

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

END OF SECTION 01340



SECTION 01524 – CONSTRUCTION WASTE MANAGEMENT

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 administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
  - 1. All of Division 1 and attached specifications and drawings that make a part of this contract.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.4 SUBMITTALS

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

- B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- D. Waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

2. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  1. Comply with Division 1 Section "Temporary Facilities" for operation, termination, and removal requirements.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
  1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  2. Comply with Division 1 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 SALVAGING DEMOLITION WASTE

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

### 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

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

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

### 3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: break up and sort rebar as best as possible. Recycle all concrete.
- C. Recycle as much product as possible and provide a complete report to TCNJ to confirm the percentage recycled on the project.

### 3.5 RECYCLING CONSTRUCTION WASTE

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



3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials on site.
- C. Burying: Do not bury waste materials on site.
- D. Disposal: Transport waste materials off Owner's property and legally dispose of them.
- E. Washing waste materials into sewers or drains is not permitted.

END OF SECTION 01524



## SECTION 017836 - WARRANTIES

### PART 1 - GENERAL

#### 1.1 DEFINITIONS

- A. Within this Section, the term Warranty shall be used to mean warranties of various types, equipment performance certifications, and similar performance guarantees, or Service/ Maintenance Agreements.
- B. Within this Section, the term Product shall be used to mean equipment, systems, products, components, and other similar aspects of the Work that have a manufacturer's or installer's warranty, or Service/ Maintenance Agreements.

#### 1.2 GENERAL WARRANTY REQUIREMENTS

- A. Basic construction warranty of work is outlined in the General Conditions of the Contract.
- B. Specific Product warranties are identified in the various Technical Specification sections.
- C. Contractor shall provide the basic construction warranty, shall provide 1-year Maintenance Bond, if required, and shall be responsible for any required Product warranties, related to the Contract.
- D. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- E. Written warranties made to The College of New Jersey are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under law. Warranty periods shall not be interpreted as limitations on time in which The College of New Jersey can enforce such other duties, obligations, rights, or remedies as established by the Uniform Commercial Code (UCC).
- F. The College of New Jersey reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- G. Where a special warranty is required on the Work or part of the Work, The College of New Jersey reserves the right to refuse to accept the Work until the responsible entities countersign such warranty.
- H. Upon determination by The College of New Jersey that Work covered by a warranty, or Service Agreement has failed, the Contractor shall replace or rebuild the Work to an acceptable condition complying with requirements of Contract. The Contractor is responsible for the total cost of replacing or rebuilding defective Work regardless of whether The College

of New Jersey benefits from use of the Work through a portion of its anticipated useful service life.

- I. When correcting warranted Work that has failed, the Contractor shall remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- J. When Work covered by a warranty, or Service Agreement has failed and been corrected by replacement or rebuilding, the warranty, or Service Agreement shall be reinstated by the Contractor by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- K. In the event the Contractor fails to commence and diligently pursue any warranty work required, The College of New Jersey may have the work performed by others, and after completion of the work, charge the cost of the work, and any reasonable and necessary expenses associated with the work incurred by the University, to the Contractor. In the event sufficient funds are not remaining in the Contract to cover the cost and expenses incurred, The College of New Jersey will have the right to recoup expenses by other legal means.

### 1.3 WARRANTY PERIODS

- A. Warranties shall commence on the Substantial Completion Date, unless one of the following apply.
- B. The Certificate of Substantial Completion designates a warranty commencement date, other than the Substantial Completion Date, for certain Work or portions of Work.
- C. By separate agreement between the Contractor and The College of New Jersey, a designated and completed portion of the Work is occupied or used by The College of New Jersey during the construction period, in which case any warranty, or Service Agreement related to that Work or portions of the Work shall commence when the occupancy or use begins.

### 1.4 SUBMITTAL OF PRODUCT WARRANTIES

- A. Written product warranties shall be submitted to The College of New Jersey within fifteen (15) days of Substantial Completion. If another date is specified per paragraph 1.03 above, written warranties shall be submitted within fifteen (15) days of that other date.
- B. When a special warranty, or Service Agreement is required to be executed by the Contractor, or by the Contractor and a subcontractor, supplier, or manufacturer, the Contractor shall prepare a written document for execution by the required parties that contains appropriate terms and identification. A draft of the written document shall be submitted to The College of New Jersey for acceptance prior to final execution.
- C. When Operating and Maintenance Manuals are required for warranted construction, an additional copy of each required warranty shall be provided, as necessary, with each Operating and Maintenance Manual.

1.5 SUBMITTAL OF WARRANTY PLAN

- A. Contractor shall prepare and submit a Warranty Plan which outlines the responsibilities and procedures to address warranty issues arising from the Contract and the Work. Contractor's Warranty Plan shall include information relative to the Work and to product warranties related to the Contract.
- B. Prior to Substantial Completion, the Contractor shall meet with The College of New Jersey to develop a mutual understanding with respect to the requirements of the Warranty Plan. Communication procedures for notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by The College of New Jersey for the execution of the warranty shall be established and reviewed at this meeting. Based on the information provided at the meeting, the Contractor shall submit to The College of New Jersey a written Warranty Plan.
- C. The Warranty Plan shall generally include all information required to assure that The College of New Jersey receives all warranties to which it is entitled and can take action with respect to calls against the warranties. The Plan shall be in sufficient detail to render it suitable for use by future College of New Jersey operations and maintenance personnel, and tailored as appropriate for the specific Contract.
- D. The Warranty Plan shall include the following information.
  - 1. The Plan shall identify key personnel associated with the warranty process, to include their specific roles and responsibilities, and their telephone numbers and other means of contact. Key personnel should be from within the organizations of the Contractor, subcontractors, manufacturers, and suppliers involved. The Contractor may choose to furnish the name, telephone number and address of a licensed and bonded company, other than itself, authorized to directly initiate and pursue warranty work on its behalf. Doing so does not relieve the Contractor of any of its responsibilities in connection with their responsibility for warranting the Work.
  - 2. The Plan shall provide a list of all product warranties and special warranties, or Service Agreement required by the Contract Documents. This list shall also provide the status of delivery of each of these warranties.
  - 3. The Plan shall provide a list of each warranted product. This list shall include the following:
    - a. name of item
    - b. model number
    - c. serial number
    - d. location where installed
    - e. name and phone numbers of manufacturer
    - f. name and phone numbers of installer
    - g. names, addresses, and telephone numbers of sources of spare parts

- h. organization, names, and phone numbers of persons to call for warranty service
- i. typical response time and repair time expected for various warranted equipment
- j. term of warranty (starting point and end point of warranty period)

1.6 TEN-MONTH WARRANTY INSPECTION

- A. Ten (10) months after the date for Substantial Completion, The College of New Jersey will conduct an inspection of the facility, and based on the inspection, prepare and provide to the Contractor a list of warranty work items that are required to be replaced or repaired under the terms of the warranty provisions of the Contract. The Contractor may be invited to participate in this inspection, but his participation is not mandatory.
- B. Upon receipt of the list of warranty work items, the Contractor shall provide to The College of New Jersey a response containing his planned actions and dates for those actions relative to the identified warranty work items. The Contractor shall complete all work items not later than twelve (12) months after the date for Substantial Completion.

PART 2 - PRODUCTS  
(Not Used)

PART 3 - EXECUTION  
(Not Used)

END OF SECTION 017836

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
  - 2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Submit Laboratory test reports for concrete materials and mix design test.
- C. Material certifications in lieu of material laboratory test reports when permitted by engineer. Material certificates shall be signed by manufacturer and contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturer that chloride content complies with specification requirements.
- D. Copies of Material Safety Data Sheets (MSDS) for any adhesives and other hazardous materials.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
  - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.
- E. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
  - 1. Build panel approximately 200 sq. ft. for slab-on-grade and 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Owner and Engineer.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

## 1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.



## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.
  - 1. Use overlaid plywood complying with U.S. Product Standard PS-1 “A-C or B-B High Density Overlaid Concrete Form”, Class I.
  - 2. Use plywood complying with U.S. Product Standard PS-1 “B-B (Concrete Form) Plywood” Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCS) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
  - 1. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

### 2.2 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301.
  - 2. ACI 117.

### 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or ASTM C1157, Type LH or GU.
  - a. Use one brand of cement throughout the Project unless otherwise specified.
  - b. Do not re-use cement which has partially set or hardened.
- B. Fly Ash:
  - 1. Permitted in drilled piers, footings, pier caps, pile caps, columns, walls, grade beams only.
  - 2. ASTM C 618, Class C or F, except maximum loss on ignition: 6%. Maximum percent retained on #325 sieve: 28%. Maximum water requirement, stated as percentage of control: 100%.

3. Testing: ASTM C311.
4. Percentage of fly ash in mix design shall be by weight, not by volume. Water/cement ratio will be calculated as water/cementitious (total cement and fly ash) ratio.
5. Prohibited: Fly ash in same mix with Type IP blended cement.
6. If strength or air content varies from value specified by more than specified tolerances, Engineer or designated representative shall reject that concrete.
7. The total fly ash contained in concrete should not be more than 20% of total cementitious materials by weight
8. Submit all fly ash concrete mix designs per ACI 301.

C. Ground Granulated Blast-Furnace Slag (GG BFS):

1. ASTM C 989, Grade 100 or higher.
2. Percentage of GGBF slag in mix design shall be by weight, not by volume. Water-cement ratio shall be calculated as water-cementitious (total Portland cement + GGBF slag) ratio.
3. If strength or air content varies from value specified by more than specified tolerances, Engineer or designated representative shall reject that concrete.
4. Total fly ash and slag contained in concrete should not be more than 30% of total cementitious materials by weight.
5. Submit all GGBF slag concrete mix designs per ACI 301.

D. Aggregates:

1. Normal weight aggregates: Aggregates shall be crushed stone or gravel complying with ASTM C 33, uniform throughout the work, with fineness modulus not varying by more than 0.15 either way from approved samples; maximum size of coarse aggregate particles shall be ½ inch for slabs on grade and 1” for other concrete. Use in all foundations, slabs on grade, walls, steps, pits, mats, etc.
2. Fine aggregates: Natural sand conforming to ASTM C33.
3. Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.

E. Water: Potable.

2.4 CONCRETE MIXING

1. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
2. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Do not chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

### 3.3 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

### 3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

### 3.5 WATERSTOP INSTALLATION

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete" and as specified.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.

3.8 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Equipment Bases: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

END OF SECTION 033000



SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.

1.3 ALLOWANCES

- A. Penetration firestopping Work is part of an allowance.

1.4 UNIT PRICES

- A. Work of this Section is affected by unit prices.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) FM Global in its "Building Materials Approval Guide."



## 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
  - 1. Permanent forming/damming/backing materials.
  - 2. Substrate primers.
  - 3. Collars.
  - 4. Steel sleeves.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. UL-classified systems are required, refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. FM Global-approved systems are required, refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

END OF SECTION 078413



SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. NETA ATS: National Electrical Testing Association.
- B. NRTL: Nationally Recognized Testing Laboratory.
- C. VFC: Variable frequency controller.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 QUALITY ASSURANCE

- 1. Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Alpha Wire.
2. Belden Inc.
3. Encore Wire Corporation.
4. General Cable Technologies Corporation.
5. Southwire Incorporated.
6. Superior Essex
7. The Okonite Company
8. Or Equivalent.

B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2, except for VFC cables which may be Type XHHW-2.

D. Metal Clad Cable Type MC: Aluminum or galvanized steel armor, color coded 90-deg. C THHN-THWN insulated copper conductors with full size green insulated grounding conductor.

## 2.2 CONNECTORS AND SPLICES

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

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. Ideal Industries, Inc.
4. Ilsco; a branch of Bardes Corporation.
5. O-Z/Gedney; a brand of the EGS Electrical Group.
6. 3M; Electrical Markets Division.
7. Tyco Electronics.
8. Or Equivalent.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## 2.3 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway, Metal-clad cable, Type MC, or Mineral-insulated, metal-sheathed cable, Type MI.
- C. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section "Hangers and Supports for Electrical Systems."
- G. Seal around cables penetrating fire-rated elements according to Specification Section "Penetration Firestopping."

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

### 3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

### 3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### 3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section "Penetration Firestopping."

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test all feeders and branch circuits for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    - b. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test and Inspection Reports: Prepare a written report to record the following:
  - 1. Procedures used.
  - 2. Results that comply with requirements.



3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519



## SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
  - 1. Section includes grounding and bonding systems and equipment

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
  - 1. Grounding arrangements and connections for separately derived systems and non-separately derived systems.
- B. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Burndy; Part of Hubbell Electrical Systems.
  - 2. ERICO International Corporation.
  - 3. Harger Lightning and Grounding.
  - 4. ILSCO.
  - 5. O-Z/Gedney; A Brand of the EGS Electrical Group.
  - 6. Robbins Lightning, Inc.
  - 7. Or Equivalent.

## 2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.
- C. CONDUCTORS
- D. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- E. Bare Copper Conductors:
  - 1. Stranded Conductors: ASTM B 8.

## 2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: All wire shall be stranded.
- B. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

### 3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

END OF SECTION 260526

## SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Hangers and supports for electrical equipment and systems.

#### 1.2 DEFINITIONS

- A. RMC: Rigid metal conduit.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel slotted support systems.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Steel slotted channel systems. Include Product Data for components.
  - 2. Equipment supports.

#### 1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Provide anchor-bolt inserts into bases.

- B. Coordinate installation of, equipment supports.

## PART 2 - PRODUCTS

### 2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit.
    - b. Cooper B-Line, Inc.
    - c. ERICO International Corporation.
    - d. GS Metals Corp.
    - e. Thomas & Betts Corporation.
    - f. Unistrut; Atkore International.
    - g. Wesanco, Inc.
  - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Hilti, Inc.
      - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.

- 3) MKT Fastening, LLC.
  - 4) Simpson Strong-Tie Co., Inc.
2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Cooper B-Line, Inc.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti, Inc.
      - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
  6. Toggle Bolts: All-steel springhead type.
  7. Hanger Rods: Threaded steel.

## 2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
  - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 7. To Light Steel: Sheet metal screws.
  - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

### 3.3 CONCRETE BASES

- A. Anchor equipment to concrete base.
  - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

### 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).



- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529



SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 MATERIALS

A. Metal Conduits, Tubing, and Fittings:

1. GRC.
2. EMT.
3. FMC: Zinc-coated steel .
4. LFMC.
5. Fittings:
  - a. EMT: Steel, setscrew or compression type.
  - b. Expansion fittings.

B. Nonmetallic Conduits, Tubing, and Fittings:

1. ENT.
2. RNC.
3. LFNC.
4. HDPE.
5. Fittings: Match conduit.

C. Metal Wireways and Auxiliary Gutters: Sheet metal with hinged covers.

D. Nonmetallic Wireways and Auxiliary Gutters: Fiberglass polyester.

E. Surface Metal Raceways: Metal, galvanized steel, with snap-on covers.

F. Surface Nonmetallic Raceways: Two- or three-piece, rigid PVC.

G. Boxes, Enclosures, and Cabinets:

1. Metal Outlet and Device Boxes: Ferrous alloy.
2. Nonmetallic outlet and device boxes.
3. Small sheet metal pull and junction boxes.
4. Cast-metal access, pull, and junction boxes.
5. Box extensions.
6. Gangable boxes are prohibited.
7. Hinged-Cover Enclosures: Metal.
8. Cabinets: Galvanized steel.

1.2 RACEWAY APPLICATION

A. Indoors:

1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed, Not Subject to Severe Physical Damage: EMT.
  3. Exposed and Subject to Severe Damage: GRC.
  4. Exposed on existing masonry walls in finished areas: Surface Metal Raceway.
  5. Concealed: EMT.
  6. Connection to Vibrating Equipment: FMC, except LFMC in damp or wet locations.
  7. Damp or Wet Locations: GRC.
  8. Boxes and Enclosures: Type 1, except Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- B. Minimum Raceway Size: (3/4-inch) trade size.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Threaded rigid steel conduit fittings.
  2. EMT: Setscrew or compression, steel fittings.
  3. Flexible Conduit: Fittings listed for use with flexible conduit.

END OF SECTION 260533

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND  
CABLING

PART 1 - GENERAL

1.1 MATERIALS

A. Sleeves:

1. Schedule 40 steel pipe.
2. Cast-iron pipe.
3. Galvanized-steel sheet for conduits penetrating non-fire-rated gypsum-board assemblies.
4. Schedule 40 PVC pipe.
5. Molded-PVC pipe.
6. Molded-PE or -PP pipe.
7. Galvanized-steel sheet for rectangular openings.

B. Sleeve-Seals:

1. EPDM rubber sealing elements.
2. Stainless-steel pressure plates.
3. Stainless-steel connecting bolts and nuts.

C. Hydraulic-cement grout.

D. Silicone Sealants:

1. Single-component, silicone-based, neutral-curing elastomeric sealant.
2. Multicomponent, silicone-based liquid elastomeric nonshrinking foam.

END OF SECTION 260544



## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

#### 1.2 ACTION SUBMITTALS

- ##### A. Product Data: For each electrical identification product indicated.

#### 1.3 QUALITY ASSURANCE

- ##### A. Comply with ANSI A13.1 and IEEE C2.
- ##### B. Comply with NFPA 70.
- ##### C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- ##### D. Comply with ANSI Z535.4 for safety signs and labels.
- ##### E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

#### 1.4 COORDINATION

- ##### A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- ##### B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- ##### C. Coordinate installation of identifying devices with location of access panels and doors.

- D. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

### 2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted or Write-on, 3-mil- thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

### 2.3 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tapes not less than 3 mils thick by 1 to 2 inches wide.

### 2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
  - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."



## 2.5 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

## 2.6 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black except where used for color-coding.

## 2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.
- G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors,

at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

- H. Painted Identification: Comply with manufacturer requirements for surface preparation and paint application.

### 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

- 1. Control.
- 2. Power.
- 3. Communications (coordinate with college IT department and requirements in Division 27).

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in pull and junction boxes, use colored conductor insulation for sizes smaller than #8AWG, and color-coding conductor tape for larger sizes.

- 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

- a. Color shall be factory applied for sizes less than #8 AWG and factory or field applied for sizes #8 AWG and larger, if authorities having jurisdiction permit.

- b. Colors for 240/120-V, Single Phase Power Circuits:

- 1) Phase A: Red
- 2) Phase B: Black
- 3) Neutral: White

- c. Colors for 208/120-V Power Circuits:

- 1) Phase A: Black.
- 2) Phase B: Red.
- 3) Phase C: Blue.

- d. Colors for 480/277-V Circuits:

- 1) Phase A: Brown.
- 2) Phase B: Orange.
- 3) Phase C: Yellow.

- e. Colors for 120 VAC Control Wire:

- 1) 120 VAC Control Power (Hot): Black
- 2) 120 VAC Control Power (Neutral): White
- 3) 120 VAC Control Circuit: Red

- f. Colors for 24 VDC Control Circuits:

- 1) 24 VDC (+): Blue
- 2) 24 VDC (common): Blue with white stripe

- g. Control wires energized by voltage source external to enclosure: Yellow

- h. Colors for 4-20mA Signal Wire:
    - 1) 4-20mA (+): Red
    - 2) 4-20mA (-): Black
  - i. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes use, self-laminating polyester labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive, self-laminating polyester labels with the conductor designation.
- F. Warning Labels for Indoor, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
- 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Controls with external control power connections.
- G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
- 1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
    - b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
  - 2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- d. Enclosed switches.
- e. Enclosed circuit breakers.
- f. Enclosed controllers.
- g. Push-button stations.
- h. Remote-controlled control devices.
- i. Monitoring and control equipment.

END OF SECTION 260553

SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Grounding conductors.
  - 2. Grounding connectors.
  - 3. Grounding rods.
  - 4. Grounding labeling.

1.3 DEFINITIONS

- A. BCT: Bonding conductor for telecommunications.
- B. EMT: Electrical metallic tubing.
- C. TGB: Telecommunications grounding busbar.
- D. TMGB: Telecommunications main grounding busbar.
- E. TBB: Telecommunication Bonding Backbone
- F. GE: Grounding Equalizer

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.5 INFORMATIONAL SUBMITTALS

- A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:
  - 1. Ground rods.
  - 2. BCT, TMGB, TGBs, and routing of their bonding conductors.

- B. Qualification Data: For Installer, installation supervisor, and field inspector.
- C. Qualification Data: For testing agency and testing agencies, field supervisor.
- D. Field quality-control reports.

## PART 2 - PRODUCTS

### 2.1 SYSTEM COMPONENTS

- A. Comply with TIA-607-B.

### 2.2 CONDUCTORS

- A. Telecommunications Bonding Backbone (TBB): All TBB shall be a minimum of #4/0 AWG.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Harger Lightning and Grounding.
  - 2. Panduit Corp.
  - 3. Tyco Electronics Corp.
  - 4. Or Equivalent.
- C. Comply with UL 486A-486B.
- D. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
  - 1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
  - 2. Cable Tray Equipment Grounding Wire: No. 6 AWG.
- E. Cable Tray Grounding Jumper:
  - 1. Not smaller than No. 6 AWG 26 kmils (13.3 sq. mm) and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.
- F. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.
  - 4. Bonding Cable: 28 kmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
  - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

## 2.3 COMPONENTS, KITS AND HARDWARE

- A. Provide BICSI/J-STD-607-A telecommunications grounding busbars for the TMGB.
  1. Harger GBI14412TMGBKT: TMGB Ground Bus bar, 1/4" x 4" x 12"
- B. Provide BICSI/J-STD-607-A telecommunications grounding busbars for the TGB.
  1. Harger GBI14212TGBKT: TGB Ground Bus bar, 1/4" x 2" x 12"
- C. Provide compression type two hole lugs for connecting conductors to TMGB and TGB.
  1. Harger GECLBxxx Series

## 2.4 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Burndy; Part of Hubbell Electrical Systems.
  2. Chatsworth Products, Inc.
  3. Harger Lightning and Grounding.
  4. Panduit Corp.
  5. Tyco Electronics Corp.
  6. Or Equivalent.
- C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
  1. Electroplated tinned copper, C and H shaped.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

## 2.5 GROUND RODS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Harger Lightning and Grounding.
  2. Tyco Electronics Corp.
  3. Or Equivalent

- B. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

## 2.6 LABELING

- A. Labeling system shall identify the terminal endpoints of each conductor segment. Coordinate labeling with Owner.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Brother International Corporation.
  - 2. HellermannTyton.
  - 3. Panduit Corp.
  - 4. Or Equivalent.
- C. Comply with TIA/EIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- D. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- E. Refer to Specification 271323 for labeling products approved for use on cable systems.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Comply with TIA-607-B.

### 3.2 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
  - 1. The bonding conductors between the New Rack and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
  - 2. The bonding conductors between the New Rack and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2 AWG minimum.
- C. Conductor Terminations and Connections:



1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

D. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm).

E. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
2. Install without splices.
3. Support at not more than 36-inch (900-mm) intervals.
4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. Conductors shall not be installed in EMT.

### 3.3 CONNECTIONS

- A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
  1. Use crimping tool and the die specific to the connector.
  2. Pretwist the conductor.
  3. Apply an antioxidant compound to all bolted and compression connections.
- D. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Coordinate attachment point with owner.

### 3.4 IDENTIFICATION

- A. Labels shall be preprinted or computer-printed type.
  1. Refer to Specification 271323 for labeling in communications systems.

### 3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- B. Prepare test and inspection reports.

END OF SECTION 270526

SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Building Industry Consulting Service International (BICSI ) And Telecommunications Industry Associates (EIA/ TIA) Commercial Building Standards for Telecommunication Pathway Standards Shall Be Followed.

1.2 SUMMARY

- A. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Optical-fiber-cable pathways and fittings.
  - 3. Boxes, enclosures, and cabinets.

1.3 ACTION SUBMITTALS

- A. Product Data: For conduits and fittings, pathways, boxes, and enclosures.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. All Manholes And Building Points Of Entry
  - 2. All Slack Loop Locations
  - 3. Structural members in paths of pathway groups with common supports.
  - 4. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For pathway racks, enclosures, cabinets, equipment racks and their mounting provisions, including those for internal components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.

4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.

D. Source quality-control reports.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUITS AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. O-Z/Gedney.
4. Southwire Company.
5. Thomas & Betts Corporation.
6. Wheatland Tube Company.
7. Or Equivalent.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with TIA-569-B.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings: Comply with NFPA 70.
2. Fittings for EMT:
  - a. Material: Steel.
  - b. Type: Setscrew or compression (for use exposed outdoors above grade).
3. Expansion Fittings: Steel to match conduit type, complying with UL-467, rated for environmental conditions were installed, and including flexible external bonding jumper.

### 2.2 OPTICAL-FIBER-CABLE PATHWAYS AND FITTINGS

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

1. Endot Industries Inc.
2. IPEX.

3. Lamson & Sessions; Carlon Electrical Products.
  4. Or Equivalent.
- B. Basis of Design Carlon: CG4X1C-XXX 1-1/4” Corrugated Non-Metallic Tubing (ENT) With Pull Tape
- C. Installation of 4” conduit from POE to MDF shall contain 3 ENT with pull strings. The three ENT within the same conduit shall be different colors: one black, one orange, and one blue.
- D. Description: Comply with UL 2024; flexible-type pathway, approved for plenum, riser, or general-use installation as required per installation location.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Comply with TIA-569-B.

### 2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Adalet.
  2. Cooper Technologies Company; Cooper Crouse-Hinds.
  3. EGS/Appleton Electric.
  4. Hoffman.
  5. Lamson & Sessions; Carlon Electrical Products.
  6. Milbank Manufacturing Co.
  7. Mono-Systems, Inc.
  8. O-Z/Gedney.
  9. RACO; Hubbell.
  10. Stahlin Non-Metallic Enclosures.
  11. Thomas & Betts Corporation.
  12. Wiremold / Legrand.
  13. Or Equivalent.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
1. Comply with TIA-569-B.
  2. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- D. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- E. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

### PART 3 - EXECUTION

#### 3.1 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
  1. Exposed Conduit: GRC .
  2. Concealed Conduit, Aboveground: GRC
  3. Underground Conduit: RNC, Type EPC-40-PVC, Type EPC-80-PVC under roadways
  4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R Type 4.
- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
  1. Exposed, Not Subject to Physical Damage: EMT
  2. Exposed, Not Subject to Severe Physical Damage: EMT
  3. Concealed in Ceilings and Interior Walls and Partitions: Flexible Non Metallic Tubing (unless otherwise noted)
  4. Damp or Wet Locations: GRC.
  5. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
  6. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: EMT.
  7. Pathways for Concealed General-Purpose Distribution of Optical-Fiber or Communications Cable: Plenum-type, communications-cable pathway or EMT.
  8. Boxes and Enclosures: NEMA 250 Type 1.
- C. Minimum Pathway Size: See Drawings. Follow BISCI Standard Fill Ratios Minimum Of 1-1/4 inch (27 mm).
- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
  1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. EMT: Use setscrew connectors. Comply with NEMA FB 2.10.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

#### 3.2 INSTALLATION

- A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.

- C. Complete pathway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Change of direction shall not occur within pulling enclosures.
- I. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- J. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT for pathways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- M. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- P. Install pull wires in empty pathways. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.
- Q. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal, rigid and flexible, as follows:
  - 1. 3/4-Inch (21-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
  - 2. 1-Inch (27-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).

3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
  4. Changes in direction shall not occur within pull or junction boxes.
- R. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.
- S. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  2. Where an underground service pathway enters a building or structure.
  3. Where otherwise required by NFPA 70.
- T. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.
- U. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
  2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
    - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
    - d. Attics: 135 deg F (75 deg C) temperature change.
  3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
  4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.



- V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

### 3.4 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

### 3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage or deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 270528



SECTION 270529 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Steel slotted support systems for communication raceways.
  - 2. Aluminum slotted support systems for communication raceways.
  - 3. Nonmetallic slotted support systems for communication raceways.
  - 4. Conduit and cable support devices.
  - 5. Support for conductors in vertical conduit.
  - 6. Structural steel for fabricated supports and restraints.
  - 7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
  - 8. Fabricated metal equipment support assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Slotted support systems, hardware, and accessories.
    - b. Clamps.
    - c. Hangers.
    - d. Sockets.
    - e. Eye nuts.
    - f. Fasteners.
    - g. Anchors.
    - h. Saddles.
    - i. Brackets.
  - 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: For fabrication and installation details for communications hangers and support systems.
  - 1. Trapeze hangers. Include product data for components.

2. Steel slotted-channel systems.
3. Aluminum slotted-channel systems.
4. Nonmetallic slotted-channel systems.
5. Equipment supports.
6. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated-Design Submittal: For hangers and supports for communications systems.

1. Include design calculations and details of trapeze hangers.
2. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Ductwork, piping, fittings, and supports.
3. Structural members to which hangers and supports will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:
  - a. Luminaires.
  - b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Projectors.

B. Seismic Qualification Certificates: For hangers and supports for communications equipment and systems, accessories, and components, from manufacturer.

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

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M

- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M.
  - 2. AWS D1.2/D1.2M.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design hanger and support system.
- B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
- C. Retain "Surface-Burning Characteristics" Paragraph below for nonmetallic slotted-channel system and accessories.
- D. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame Rating: Class 1.
  - 2. Self-extinguishing according to ASTM D 635.

### 2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch diameter holes at a maximum of 8 inches o.c. in at least one surface.
  - 1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  - 2. Material for Channel, Fittings, and Accessories: Galvanized steel
  - 3. Channel Width: 1-5/8 inches
  - 4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  - 6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  - 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
  - 8. Channel Dimensions: Selected for applicable load criteria.
- B. Aluminum Slotted Support Systems: Extruded aluminum channels and angles with minimum 13/32-inch diameter holes at a maximum of 8 inches o.c. in at least one surface.
  - 1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

2. Channel Width: 1-5/8 inches
  3. Channel Material: 6063-T6 aluminum alloy.
  4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
  5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
  8. Channel Dimensions: Selected for applicable load criteria.
- C. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch diameter holes at a maximum of 8 inches o.c., in at least one surface.
1. Standard: Comply with MFMA 4.
  2. Channel Width: 1-5/8 inches
  3. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
  4. Fitting and Accessory Materials: Same as those for channels and angles
  5. Rated Strength: Selected to suit applicable load criteria.
  6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Conduit and Cable Support Devices: Steel clamps, hangers, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored communications conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
  2. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

### 2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
  1. NECA 1.
  2. NECA/BICSI 568.
  3. TIA-569-C.
  4. NECA 101
  5. NECA 102.
  6. NECA 105.
  7. NECA 111.
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for pathways specified in Section 270528 "Pathways for Communications Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with two-bolt conduit clamps
  2. Retain paragraph below for projects where seismic design requirements do not apply. Consider retaining for light-commercial projects only.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, according to NFPA 70.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten communications items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Use approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Use expansion anchor fasteners.
  - 5. Instead of expansion anchors, powder-actuated-driven threaded studs, provided with lock washers and nuts, may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
  - 6. To Light Steel: Sheet metal screws.
  - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor communications materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

### 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils
- B. Touchup: Comply with TCNJ requirements for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.



- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas, and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 270529



SECTION 270543 - UNDERGROUND PATHWAYS AND STRUCTURES FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Metal conduit and fittings, including GRC and PVC-coated GRC.
  - 2. Rigid nonmetallic duct.
  - 3. Duct accessories, including rigid innerduct and fabric innerduct.
  - 4. Precast manholes.
  - 5. Utility structure accessories.

1.3 DEFINITIONS

- A. Direct-Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials, such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
  - 1. Two or more ducts installed in parallel, with or without additional casing materials.
  - 2. Multiple duct banks.
- D. GRC: Galvanized rigid conduit.
- E. RNC: Rigid nonmetallic conduit.
- F. Trafficways: Locations where vehicular or pedestrian traffic is a normal course of events.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include duct-bank materials, including spacers and miscellaneous components.
  - 2. Include duct and conduits and their accessories, including elbows, end bells, bends, fittings, duct spacers and solvent cement.
  - 3. Include accessories for manholes and handholes

4. Include underground-line warning tape.
- B. Shop Drawings:
1. Precast or Factory-Fabricated Underground Utility Structures:
    - a. Include plans, elevations, sections, details, attachments to other work, and accessories.
    - b. Include duct entry provisions, including location and duct size.
    - c. Include reinforcement details.
    - d. Include frame and cover design and manhole chimneys.
    - e. Include ladder /step details.
    - f. Include grounding details.
    - g. Include dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
    - h. Include joint details.
  2. Factory-Fabricated Handholes and Boxes Other Than Precast Concrete:
    - a. Include dimensioned plans, sections, and elevations, and fabrication and installation details.
    - b. Include duct entry provisions, including location and duct size.
    - c. Include cover design.
    - d. Include grounding details.
    - e. Include dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Duct and Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
  2. Shop drawing for areas where duct bank will cross an existing duct bank or utility. Details showing appropriate shoring and reinforcement shall be provided.
  3. Drawings shall be signed and sealed by a qualified professional engineer.
- B. Product Certificates: For concrete and steel used in precast concrete manholes as required by ASTM C 858.
- C. Qualification Data: For professional engineer and testing agency responsible for testing nonconcrete handholes and boxes.
- D. Source quality-control reports.
- E. Field quality-control reports.

1.6 MAINTENANCE MATERIALS SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Furnish cable-support stanchions, arms, and associated fasteners in quantities equal to 5 percent of quantity of each item installed.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.8 FIELD CONDITIONS

- A. Interruption of Existing Communications Service: Do not interrupt communications service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary communications service according to requirements indicated:
  - 1. Notify Engineer/ Owner no fewer than five days in advance of proposed interruption of communications service.
  - 2. Do not proceed with interruption of communications service without Engineer/ Owner written permission.
- B. Ground Water: Assume ground-water level is at grade level unless a lower water table is noted on Drawings.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. GRC: Comply with ANSI C80.1 and UL 6.
- B. PVC-Coated Steel Conduit: PVC-coated GRC.
  - 1. Comply with NEMA RN 1.
  - 2. Coating Thickness: 0.040 inch, minimum.
- C. General Requirements for Metal Conduits and Fittings:
  - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
  - 2. Comply with TIA-569-C and TIA-758-C.

## 2.2 RIGID NONMETALLIC DUCTS

- A. Underground Plastic Utilities Duct: Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. General Requirements for Nonmetallic Ducts and Fittings:
  - 1. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.
  - 2. Comply with TIA-569-C and TIA-758-C.
- C. Solvents and Adhesives: As recommended by duct manufacturer.

## 2.3 DUCT ACCESSORIES

- A. Innerduct: Corrugated HDPE duct, designed for installation within an underground duct or pathway.
  - 1. Basis of Design Carlon Or Equivalent: A6D2S1JNNB Standard Wall 1-1/4” Corrugated HDPE With Pull Tape.
  - 2. Installation of 3 innerducts in each active conduit within a duct bank. The three inner ducts within the same conduit shall be different colors: one black, one orange, and one green.
  - 3. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Duct Spacers: Factory-fabricated rigid PVC interlocking spacers, sized for type and size of duct with which used, and selected to provide minimum duct spacing indicated while supporting duct during concreting or backfilling.
- C. Underground-Line Warning Tape: Underground-line warning tape.
- D. Traceable muletape: (Neptco DT900P) Flat woven polyester with insulated 22AWG conductor, equipped with footage markings and impregnated lubricant. 1/2" nominal width, 900-lb pulling strength.

## 2.4 PRECAST MANHOLES

- A. Description: One-piece units and units with interlocking mating sections, complete with accessories, hardware, and features.
- B. Standard: Comply with ASTM C 858.
- C. Structural Design Loading: Comply with requirements in "Underground Enclosure Application" Article.

- D. Knockout Panels: Precast openings in walls, arranged to match dimensions and elevations of approaching duct and duct banks, plus an additional 6 inches vertically and horizontally to accommodate alignment variations.
1. Splayed location.
  2. Knockout panels shall be located no less than 6 inches from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
  3. Knockout panel opening shall have cast-in-place, welded-wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
  4. Knockout panel openings shall be framed with at least two additional No. 3 steel reinforcing bars in concrete around each opening.
  5. Knockout panels shall be 1-1/2 to 2 inches thick.
- E. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
1. Type and size shall match fittings to duct or conduit to be terminated.
  2. Fittings shall align with elevations of approaching duct and be located near interior corners of manholes to facilitate racking of cable.
- F. Ground Rod Sleeve: Provide a 3-inch PVC sleeve in manhole floors 2 inches from the wall adjacent to, but not underneath, the duct routed from the facility.
- G. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

## 2.5 UTILITY STRUCTURE ACCESSORIES

- A. Accessories for Utility Structures: Utility equipment and accessory items used for utility structure access and utility support, listed and labeled for intended use and application.
- B. Accessory - Manhole cover and frame
1. Frames and covers shall be made of gray cast iron and a machine-finished seat shall be provided to ensure a matching joint between frame and cover. Cover shall incorporate a lip on the underside to facilitate removal with a standard manhole hook, as well as open pick holes at opposite edges. Frames and covers shall be rated for wheel loads in accordance HS-20 rating and shall comply with ASTM A 48, Class 30B, minimum. Frame shall provide for an opening minimum diameter 30", maximum 36". Frame shall include a flange suitable and equipped for fastening to the manhole structure.
  2. The cover shall be round. The phrase "COMMUNICATIONS" shall be stamped or cast into the cover.
- C. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2-inch diameter eye, and 1-by-4-inch bolt.
- D. Working Load Embedded in 6-Inch 4000-psi Concrete: 13,000-lbf minimum tension.

- E. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch- diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
  - 1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.
- F. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to a minimum of 1-1/4 inches at base.
  - 1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.
- G. Ground Rod Sleeve: 3-inch (75-mm), PVC duct sleeve in manhole floors 2 inches (50 mm) from the wall adjacent to, but not underneath, the duct entering the structure.
- H. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip, with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.
- I. Cable racking assemblies shall be: Hot-dip galvanized cable racks with a plastic coating over the galvanizing shall be installed in each communications manhole. Racking supports shall extend floor to ceiling of manhole, with a minimum of three supports per side distributed evenly across the wall (typical for all four walls). Provide three racking hooks per racking support; two (2) of which shall be 3” arms and one (1) shall have an 18” arm.
- J. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and adhering to clean surfaces of plastic duct, metallic duct, duct coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
- K. Cover Hooks: Heavy duty, designed for lifts 60 lbf and greater.

## 2.6 SOURCE QUALITY CONTROL

- A. Test and inspect precast concrete utility structures according to ASTM C 1037.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Coordinate layout and installation of duct, duct bank, manholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Notify Owner / Engineer if there is a conflict between areas of excavation and existing structures or archaeological sites to remain.
- B. Coordinate elevations of duct and duct-bank entrances into manholes, and boxes with final locations and profiles of duct and duct banks, as determined by coordination with other



utilities, underground obstructions, and surface features. Revise locations and elevations as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

- C. Clear and grub vegetation to be removed and protect vegetation to remain.

### 3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Communications: Type EPC-40-PVC RNC, in concrete-encased duct bank unless otherwise indicated.
- B. Stub-Ups for Communications: Concrete-encased RNC.

### 3.3 UNDERGROUND ENCLOSURE APPLICATION

- A. Manholes: Precast concrete.
  - 1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.
  - 2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating according to AASHTO HB 17.

### 3.4 EARTHWORK

- A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.
- B. Restoration: Replace area immediately after backfilling is completed.
- C. Restore surface features at areas disturbed by excavation and re-establish original grades unless otherwise indicated.
- D. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary top soiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.
- E. Cut and patch existing pavement in the path of underground duct, duct bank, and utility structures.

### 3.5 DUCT AND DUCT-BANK INSTALLATION

- A. Where indicated on Drawings, install duct, spacers, and accessories into the duct configuration shown. Duct installation requirements in this Section also apply to duct bank.
- B. Install duct and duct bank according to NEMA TCB 2 and TIA-758-C.

- C. Slope: Pitch duct and duct bank a minimum slope of 1:100 down toward manholes and handholes and away from buildings and equipment. Slope duct and duct bank from a high point in runs between two manholes, to drain in both directions.
- D. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations unless otherwise indicated.
  - 1. Duct and duct banks shall have maximum of two 90-degree bends, or the total of all bends shall be no more 180 degrees between pull points.
- E. Joints: Use solvent-cemented joints in duct and fittings and make watertight according to manufacturer's written instructions. Stagger couplings, so those of adjacent ducts do not lie in same plane.
- F. Installation Adjacent to High-Temperature Steam Lines: Where duct or duct banks are installed parallel to underground steam lines, perform calculations showing the duct or duct bank will not be subject to environmental temperatures above 40 deg C. Where environmental temperatures are calculated to rise above 40 deg C, and anywhere the duct or duct bank crosses above an underground steam line, install insulation blankets listed for direct burial to isolate the duct bank from the steam line.
- G. End-Bell Entrances to Manholes: Use end bells, spaced approximately 6 inches o.c. for 4-inch duct, and vary proportionately for other duct sizes.
  - 1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct slope and without forming a trap in the line.
  - 2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole. Install an expansion fitting near the center of all straight-line direct-buried duct and duct banks, with calculated expansion of more than 3/4 inch.
  - 3. Grout end bells into structure walls from both sides to provide watertight entrances.
- H. Terminator Entrances to Manholes: Use manufactured, cast-in-place duct terminators, with entrances into structure spaced approximately 6 inches o.c. for 4-inch duct, and vary proportionately for other duct sizes.
  - 1. Begin change from regular spacing to terminator spacing 10 feet from the terminator without reducing duct slope and without forming a trap in the line.
  - 2. Expansion and Deflection Fittings: Install an expansion and deflection fitting in each duct in the area of disturbed earth adjacent to manhole. Install an expansion fitting near the center of all straight-line duct or duct bank, with calculated expansion of more than 3/4 inch.
- I. Building Wall Penetrations: Make a transition from underground duct at least 10 feet outside the building wall, without reducing duct slope away from the building or forming a trap in the duct. Install penetrations of building walls as specified in Section 270544 "Sleeves and Sleeve Seals for Communications Pathways and Cabling."

- J. Sealing: Provide temporary closure at terminations of duct that has cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig (1.03-MPa) hydrostatic pressure.
- K. Innerduct: Install immediately after mandreling duct. Provide three innerducts per duct
- L. Pulling Cord: Install 200-lbf- (1000-N-m) test nylon cord in empty duct and innerduct.
- M. Detectable Muletape: Install 900-lbf detectable muletape in each empty duct. Provide 25-foot slack loop on each end and secure to anchor point in manhole. Install label tag on each muletape, label text coordinated with Owner.
- N. Concrete-Encased Duct and Duct Bank:
  - 1. Excavate trench bottom to provide firm and uniform support for duct or duct bank. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes less than 6 inches in nominal diameter.
  - 2. Width: Excavate trench 12 inches wider than duct or duct bank on each side.
  - 3. Depth: Install top of duct and duct bank at least 24 inches below finished grade in areas not subject to deliberate traffic, and at least 30 inches below finished grade in deliberate traffic paths for vehicles unless otherwise indicated.
  - 4. Support duct and duct bank on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
  - 5. Minimum Space Between Duct: 3 inches between edge of duct and exterior envelope wall, 3.5 inches between ducts.
  - 6. Spacer Installation: Place spacers close enough to prevent sagging and deforming of duct, with not less than four spacers per 20 feet of duct. Place spacers within 24 inches of duct ends. Stagger spacers approximately 6 inches between tiers. Secure spacers to earth and duct to prevent floating during concreting. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around duct or duct bank. Maintain clearance from conduit bank, to trench base and sides for complete concrete encasement
  - 7. Elbows: Use manufactured duct elbows for stub-ups, at building entrances, and at changes of direction in duct run unless otherwise indicated. Extend concrete encasement throughout length of elbow.
  - 8. Elbows: Use manufactured PVC-coated GRC elbows for stub-ups, at building entrances.
    - a. Couple PVC-coated GRC to duct with adapters designed for this purpose and encase coupling with 3 inches of concrete.
    - b. Stub-Ups to Indoor Equipment: Extend concrete-encased PVC-coated GRC horizontally a minimum of 60 inches (1500 mm) from edge of wall. Install insulated grounding bushings on terminations at equipment.
      - 1) Stub-ups shall be minimum 4 inches above finished floor and no less than 3 inches from conduit side to edge of wall.

9. Reinforcement: Reinforce concrete-encased duct and duct bank where they cross existing utilities and infrastructure. Duct banks shall be supported independently of any existing utilities or infrastructure. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
10. Forms: Use trench walls to form side walls of duct and duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
11. Concrete Cover: Install a minimum of 3 inches of concrete cover between edge of duct to exterior envelope wall, 3.5 inches between ducts.
12. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
  - a. Start at one end and finish at the other, allowing for expansion and contraction of duct as its temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations or use other specific measures to prevent expansion-contraction damage.
  - b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing-rod dowels extending a minimum of 18 inches into concrete on both sides of joint near corners of envelope.
13. Pouring Concrete: Comply with requirements in "Concrete Placement" Article in Section 033000 "Cast-in-Place Concrete." Place concrete carefully during pours to prevent voids under and between ducts and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto duct. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

### 3.6 INSTALLATION OF CONCRETE MANHOLES

#### A. Precast Concrete Manhole Installation:

1. Comply with ASTM C 891 unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting duct, to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

#### B. Elevations:

1. Manhole Roof: Install with rooftop at least 15 inches below finished grade.
2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch above finished grade.
3. Manhole shall be set so that cover / associated frame is 1" above surrounding finished grade for green areas and flush for hard scape areas.

#### C. Drainage: Install drains in bottom of manholes where indicated.

- D. Manhole Access: Circular opening in manhole roof; sized to match cover size.
  - 1. Install chimney, constructed of precast concrete collars and rings, to support cast-iron frame to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for frame to chimney.
  - 2. Install pins or bolts to attach collars and rings to manhole top, each other, and to the frame for the cover.
- E. Waterproofing: Apply waterproofing to exterior surfaces of manholes after concrete has cured at least three days. After duct has been connected and grouted, and before backfilling, waterproof joints and connections, and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.
- F. Hardware: Install removable hardware, including pulling eyes, cable stanchions, cable arms, as required for installation and support of cables and conductors and as indicated.
- G. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than 3-7/8 inches for manholes and 2 inches for handholes, for field-installed anchor bolts installed. Use a minimum of two anchors for each cable stanchion.

### 3.7 GROUNDING

- A. Ground underground duct, duct bank, and utility structures according to Section 270526 "Grounding and Bonding for Communications Systems."
- B. Ground Rods
  - 1. A ground rod shall be installed in the manholes, handholes and pullboxes. Ground rods shall be driven into the earth so that approximately 4 inches of the ground rod will extend above the manhole floor. Position the ground rod along the wall to avoid a tripping hazard.
  - 2. Provide copper grounding bus ring around upper perimeter of manhole, constructed of bare 4/0 copper cable. Support cable on walls with clips and anchors at intervals not to exceed 24". Bond ground conductor to ground rod using exothermic weld. Bond ground conductor to cable rack arms and ductbank ground conductor.

### 3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
  - 1. Demonstrate capability and compliance with requirements on completion of installation of underground duct, duct bank, and utility structures.
  - 2. Conduit Mandrelling - mandrel conduit and correct issues prior to concrete encasement.
    - a. Owner to be present during manrelling for observation.

3. Pull solid aluminum or wood test mandrel through duct to prove joint integrity and adequate bend radii, and test for out-of-round duct. Provide a minimum 12-inch- (300-mm-) long mandrel equal to duct size minus 1/4 inch (6 mm). If obstructions are indicated, remove obstructions and retest. This Test Should Be Performed Before Concrete Encasement.
  4. Test manhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 270526 "Grounding and Bonding for Communications Systems."
- B. Correct deficiencies and retest as specified above to demonstrate compliance.

### 3.9 CLEANING

- A. Duct shall be cleaned with an assembly that consists of a flexible mandrel (1/4-inch) less than inside diameter of duct, 2 wire brushes, and a rag. The cleaning assembly shall be pulled through each conduit a minimum of 2 times, or until less than a volume of 8 cubic inches of debris is expelled from the duct. Traceable mule tape and A nylon pull line with a test strength of 200 lbs. shall be installed in each conduit after cleaning.
- B. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris.
- C. Clean internal surfaces of manholes, including sump.
  1. Sweep floor, removing dirt and debris.
  2. Remove foreign material.

END OF SECTION 270543

SECTION 270544 - SLEEVES AND SLEEVE SEALS FOR COMMUNICATIONS PATHWAYS AND  
CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

- C. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

D. Sleeves for Rectangular Openings:

1. Material: Galvanized-steel sheet.
2. Minimum Metal Thickness:
  - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
  - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Advance Products & Systems, Inc.
  - b. CALPICO, Inc.
  - c. Metraflex Company (The).
  - d. Pipeline Seal and Insulator, Inc.
  - e. Proco Products, Inc.
  - f. Or Equivalent.
2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Presealed Systems.
  - b. Or Equivalent.



## 2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## 2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
  - 2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

## PART 3 - EXECUTION

### 3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint.
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- C. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
  2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- E. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 270544

SECTION 271323 - COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Optical fiber cable, hybrid (single-sheath) OS2 (9/125-micron) / OM1 (62.5/125-micron) for OSP and indoor installation.
2. Optical fiber cable, hybrid (single-sheath) OS2 (9/125-micron) / OM3 (50/125-micron) for OSP and indoor installation.
3. Optical fiber cable, hybrid (single-sheath) OS2 (9/125-micron) / OM4 (50/125-micron) for OSP and indoor installation.
4. Optical fiber patch cords.
5. Optical fiber cable termination and enclosure hardware.
6. Cabling identification products.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. IDC: Insulation displacement connector.
- D. LAN: Local area network.
- E. RCDD: Registered Communications Distribution Designer.

1.4 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

- A. Optical fiber backbone cabling system shall provide interconnections between Main Distribution Frame (MDF) communications equipment rooms in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in MDF communications equipment rooms.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568-C, when tested according to test procedures of this standard.

1.6 ACTION SUBMITTALS

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

B. Substitutions

1. All functions and features specified herein are to be provided by the contractor. Where specific manufacturer's names and model numbers are specified, such identification is to identify the expected performance parameters and to functionally define the specific product requirement.
2. Where a contractor intends to provide goods other than those specifically identified, such "equivalent" items must be clearly identified in the submittals. "Equivalent" items must include written certification from the manufacturer of the substitute item stating the equivalency of each and every substituted item relative to the specified items in regard to features, function, performance and future expansion capability.
3. Contractors wishing to provide "equivalent" products for specified devices may be required to demonstrate the equivalency of the proposed substitute items to the Owner, at the contractor's expense. Such proof of equivalency, in addition to the manufacturer's letter as noted above, may include the following:
  - a. An on-site, side-by-side sample demonstration of both the specified and proposed substitute items.
  - b. A formal bipartisan, laboratory test report comparing the technical performance of each and every proposed substitute, versus specified item.
  - c. Such test reports for IT System components will include a spreadsheet comparison of all critical dimensions, performance characteristics, compatibilities, etc.
  - d. The responsibility of proving the equivalency of substitute products with respect to the specified products shall lie solely with the contractor.
  - e. All costs associated with providing information or performing the above outlined tests and comparisons required to confirm the equivalency of substitute products will be at the sole expense of the contractor. Such costs may include but are not limited to:
    - 1) Independent laboratory tests
    - 2) Cost of equipment items for demonstration of specified and proposed substitute items
    - 3) Contractor incurred travel costs and miscellaneous expenses
    - 4) Professional Services Fees (architects, engineers and consultants) charged to the Owner as a result of time charged to participating in the review of proposed substitute items.

4. All requests for substitution shall be made to the Engineer, accompanied by a product data sheet submittal as outlined in the Specifications. The Engineer will distribute documentation to the Owner for review.
5. The Engineer and Owner have no obligation to consider or approve requests for substitution after award of contract.

C. Shop Drawings:

1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
3. Cabling administration drawings and printouts.
4. Wiring diagrams to show typical wiring schematics including the following:
  - a. Cable segments and routing.
  - b. Termination points and enclosures.
  - c. Final (field-installed) cable segment and terminal enclosure identifiers.
5. Termination points and enclosures. Detail mounting assemblies and show elevations and physical relationship between the installed components.
6. Network Diagram
  - a. Network diagram submittal as shop drawing for the campus which shall include the following information:
    - 1) Product information submittal
    - 2) System diagram (Point to point) that includes all cables, connectors, and system calculations including loss budget analysis, power budget, and loss margin calculation.
  - b. The specifications on each fiber shall also be indicated including: manufacturer, type, quantity, cable construction type, length, installation type.
    - 1) Performance requirements shall be indicated along with all relevant information (bandwidth, total fiber loss, total connector loss, other losses)
    - 2) Once calculations are completed, approved, and fiber installation completed the system shall be tested. OTDR and End to End loss of every fiber being utilized shall be completed and the calculated data shall be utilized as the criteria for the testing.
7. Shop Drawings are to be submitted on project standard full size and bound. Each shop drawing set is to include the below in the following order:
  - a. Title Sheet.
    - 1) Containing, at a minimum, a list of all drawings in the set and a symbols legend defining each symbol used in the package.
  - b. Riser Diagram.

- 1) Show the relationship of TR's, the pathway between them, and cable connectivity to be installed.
  - c. Telecommunications Room Details.
    - 1) Plan Details of infrastructure and room fittings with clearances, Elevation Details of wall fields and rack details showing the relationship of rack mounted elements inclusive of Owner provided equipment (labeled as such).
  - d. Floor Plans / Site Plans.
    - 1) Show planned location for all elements and cable routing. Drawings should be at project standard scale clearly legible. Include outlet port numbers for each outlet.
    - 2) Provide layout plans identifying proposed locations of slack loops for each cable routing. Refer to project drawings for further information.
  - e. Field quality-control reports. Submit copy of project status reporting form.
8. Submittal Data is to be submitted in a three-ring binder, a continuous spiral binder, or plastic binding that allows the booklet to lie flat while open. Each booklet shall contain the below in the following order:
- a. Cover Sheet.
    - 1) Include name of supplying contractor and project name.
  - b. Detailed Bill of Materials.
    - 1) Include a listing of: component quantities, equipment manufacturer, model number, and description of each component being supplied, and the specification paragraph or drawing sheet that corresponds to the product. Failure to provide this information will result in the rejection of submittals.
  - c. Product Data.
    - 1) Include a catalog sheet per product of equipment listed in the Detailed Bill of Materials, in the exact order as the Detailed Bill of Materials. Each catalog sheet shall describe mechanical, electrical and functional equipment specifications. The catalog sheet must also include an image of the product. Photocopy duplications of the manufacturer's original equipment catalog sheets will be allowed as long as they provide adequate clarity of both the printed word and graphics/pictures. If more than one product is shown on the catalog sheet the intended product must be denoted by either an arrow or highlight.
  - d. Installer Qualifications

- 1) Provide the following to demonstrate adequate experience and minimum qualifications.
    - a) Corning EWP Certificate
  - 2) Installing company shall be certified by manufactures in aspects of design, installation and testing of optical premise distribution systems, be a manufactures Value Added Reseller (VAR) in good standing, with a current, active certification that has been continuous for at least the last 24 months.
  - 3) Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer and manufactures certified installer, who shall be present at all times when Work of this Section is performed at Project site. One half of remainder of the crew shall be at a minimum Registered Technicians by manufacture as part of their Certified Installer Program.
  - 4) Installer shall provide project information detailing a minimum of five (5) years of experience on similar Structured Cabling Systems (SCS).
- e. Prequalification Warrantee.
- 1) Recently dated (within one year from submittal date) support letter from manufacturer stating that the supplying contractor is Authorized to obtain for the owner the Extended Warranty for Cabling System and the Extended Warranty for System Assurance.
  - 2) Prequalification shall include demonstrating 24 months continuous active certification in the extended warranty program, from the date of the submittal.
- f. Prequalification Certificate.
- 1) Copy of the installing technician(s) certificate of completion from the manufacturer's training school for the equipment being provided.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installation supervisor, and field inspector.
- B. Source quality-control reports.
  1. ISO9001 and 14001 certifications
- C. Field quality-control reports.

#### 1.8 CLOSEOUT SUBMITTALS

- A. Software and Firmware Operational Documentation:
  1. Software operating and upgrade manuals.
  2. Program Software Backup: On USB media or compact disk, complete with data files.

3. Device address list.
  4. Printout of software application and graphic screens.
- B. Maintenance Data: For optical fiber cable, splices, and connectors to include in maintenance manuals.
- C. At the completion of the installation, but before Final Acceptance, provide for review and approval the following, in compliance with Closeout Procedures.
1. Operation and Maintenance Manuals:
    - a. Equipment manufacturer's operation and service manuals for each make and model of equipment. Submit in both hard-copy and electronic (.pdf) formats.
  2. Warranty
    - a. Provide list and dates of activation of equipment warranties
    - b. Provide original manufacturers' certificate of SCS extended warranty.
  3. As-built Drawings
    - a. Include contractor generated (mark-up of contract documents is not acceptable) digital record diagrams for all systems including, but not limited to:
      - 1) Floor Plans, including final outlet locations and identification. Refer to Article 3 of this specification for additional details.
      - 2) Cable identification spreadsheet. Provide both hard-copy (laminated) and Excel version. Include all relevant data, including cable identification, make, color, source room, destination room, termination location, etc.
      - 3) Provide laminated hard-copy of each document for each applicable Telecommunications Room.
      - 4) Provide butterflies for each manhole and building POE, showing the location and routing of each cable removed and each cable installed, with each cable's unique identifier.
  4. Testing Results
    - a. Submit hard-copy and electronic (Excel) test result data. Refer to Article 3 of this specification for additional details.
    - b. Submit copy of native tester results datafile, and copy of reader software on USB. Datafiles shall be organized by link segment, organization readily apparent through file listing.

#### 1.9 FIBER INTERCONNECT DESIGN AND TESTING REQUIREMENTS

1. The Contractor shall develop shop drawings to interconnect fiber segments as required to establish the communications links between fire system components. Fiber interconnects for the fire alarm system shall be established using the following procedure, in overview:



- a. The Contractor will utilize appropriate Manufacturer system documentation to construct a proposed interconnect plan.
  - b. The Contractor will furnish Basis of Design optical loss calculations for each link. Calculations shall include a 5% total margin above the manufactures tolerance.
  - c. The Contractor will overlay the proposed design on a campus map to depict the link endpoints between campus facilities.
  - d. The Contractor will coordinate the proposed design with the Manufacturer for approval.
  - e. The Contractor will furnish the proposed design and associated supporting documentation to The College and its engineer for review and acceptance.
  - f. Using the final accepted design, the contractor shall build the interconnected links using plant fiber allocated for the purpose; the installer will furnish and install all fiber jumpers necessary to construct the links, in coordination with TCNJ/IT.
  - g. The Contractor will test each link for optical signal loss and confirm the performance requirements with the accepted design.
  - h. Prior to connecting each link, the installer will conduct bi-directional optical loss, and optical time-domain reflectometry tests, documenting these for each link.
  - i. Installer will interconnect the intended components with the link and confirm component operation. Record signal levels reported by the interconnected system components.
2. Design and testing information will be collected for the campus-wide system. Information will be furnished in electronic and hard copy format.
  3. Each individual FACP will be equipped with a printed design and test documentation set specific to the panel, intended for future use in troubleshooting and maintenance.

#### 1.10 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Termination cassettes: Two of each type.
  2. Fiber patch cords,10 of each type (configuration and length)
  3. Patch cord labeling mandrels, 100 (1 pack) each type

#### 1.11 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings by an RCDD.
  2. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer and manufactures certified installer, who shall be present at all times when Work of this Section is performed at Project site. One half of remainder of the crew

- shall be at a minimum Registered Technicians by manufacturer as part of their Certified Installer Program.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Certified by BICSI.
1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
  2. Smoke-Developed Index: 50 or less
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Have a Registered Communications Distribution Designer (RCDD) on staff.
- F. Installing company shall have demonstrated experience with Corning products specified herein and will be required to provide documentation of this experience.
- G. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-C.
- H. Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, ANSI/TIA/EIA – 606
- I. Grounding: Comply with ANSI-J-STD-607-B.
- J. NFPA 70 – National Electric Code
- K. BICSI – Telecommunications Distribution Methods Manual, 13th Edition
- L. NEMA – VE-1 – Metal Cable Tray Systems, 2017
- M. NEMA – VE-2 – Metal Cable Tray Installation Guidelines, 2013
- N. Grounding: Comply with TIA-607-B.
- 1.12 WARRANTY
- A. Special Warranty for Cabling System: Manufactures warranty shall ensure against product defects; that approved cabling components exceed the specifications of TIA/EIA 568C and ISO/IEC IS 11801; and that the installation will exceed the loss and bandwidth requirements of TIA-568-C and ISO/IEC IS 11801 for fiber links/channels. The warranty shall apply to passive SCS components.

1. Warranty Period: 25-year Cabling System from date of Substantial Completion.
  2. Warranties shall include certification under Corning EWP.
- B. Special Warranty for System Assurance: Manufactures warranty shall cover the failure of the cabling system to support the application which it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that recognize TIA/EIA 568C or ISO/IEC IS 11801 component and link/channel specifications for cabling.
1. Warranty Period: 25-year Applications Assurance from date of Substantial Completion.
  2. Warranties shall include certification under Corning EWP

#### 1.13 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
  2. Test each optical fiber in the cable assembly while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
- B. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

#### 1.14 COORDINATION

- A. Coordinate layout and installation of communications equipment with Owner's IT department.
1. Meet with Owner's IT representatives to Coordinate OFE equipment and their required connections.
  2. Record agreements reached in meetings and distribute them to other participants.
  3. Adjust arrangements and locations of equipment racks, termination cassettes, and connector housings in equipment rooms to accommodate and optimize arrangement and space requirements of equipment.
- B. Coordinate layout and installation of communication pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.
- C. A labeling scheme for fiber system components shall be established in coordination with Owner's IT department. Each fiber jumper shall be labeled at each end with the approved identifier. Identifiers shall be placed on system as-build plans.
- D. Fiber jumpers shall be furnished to the specifications included herein. Lengths shall be as described, generally sufficient to connect two points with minimal slack necessary for maintenance. Fiber jumpers shall be of the fiber performance type required for the interconnection, equipped with red color jackets, terminated in the required connectors;

connector adapters will not be accepted. Each fiber jumper shall be equipped with a colored designator indicating the fiber performance type, as per the specifications.

## PART 2 - PRODUCTS

### 2.1 HYBRID (SINGLE-SHEATH) OS2 / OM1, OS2 / OM3, OS2 / OM4 INDOOR AND INDOOR/OUTDOOR OPTICAL FIBER CABLE. Basis of Design: Corning or Equivalent.

A. Description: Hybrid (single-sheath) OFNR-rated OS2 (9/125-micrometer) / OM1 (62.5/125-micrometer), OM3 (50/125-micrometer), OM4 (50/125-micrometer) gel-free waterblocked, ribbon fiber optical cable.

#### 1. 24-Fiber Cable

- a. 024XC7-XXXXXX-20 - 24-Fiber Ribbon Cable indoor OFNR hybrid:12-fibers OS2 SMF / 12-fibers 62.5micron OM1 standard
- b. 024XCF-XXXXXD20 - 24-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:12-fibers OS2 SMF / 12-fibers 62.5micron OM1 standard
- c. 024XC7-XXXXXX-20 - 24-Fiber Ribbon Cable indoor OFNR hybrid:12-fibers OS2 SMF / 12-fibers 50micron OM3 standard
- d. 024XCF-XXXXXD20 - 24-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:12-fibers OS2 SMF / 12-fibers 50micron OM3 standard
- e. 024XC7-XXXXXX-20 - 24-Fiber Ribbon Cable indoor OFNR hybrid:12-fibers OS2 SMF / 12-fibers 50micron OM4 standard
- f. 024XCF-XXXXXD20 - 24-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:12-fibers OS2 SMF / 12-fibers 50micron OM4 standard

#### 2. 48-Fiber Cable

- a. 048XCF-XXXXXD20 - 48-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:24-fibers OS2 SMF / 24-fibers 62.5micron OM1 standard
- b. 048XCF-XXXXXD20 - 48-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:24-fibers OS2 SMF / 24-fibers 50micron OM3 standard
- c. 048XCF-XXXXXD20 - 48-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:24-fibers OS2 SMF / 24-fibers 50micron OM4 standard

#### 3. 72-Fiber Cable

- a. 072XCF-XXXXXD20 - 72-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:36-fibers OS2 SMF / 36-fibers 62.5micron OM1 standard

- b. 072XCF-XXXXXD20 - 72-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:36-fibers OS2 SMF / 36-fibers 50micron OM3 standard
  - c. 072XCF-XXXXXD20 - 72-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:36-fibers OS2 SMF / 36-fibers 50micron OM4 standard
4. 96-Fiber Cable
- a. 096XCF-XXXXXD20 - 96-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:48-fibers OS2 SMF / 48-fibers 62.5micron OM1 standard
  - b. 096XCF-XXXXXD20 - 96-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:48-fibers OS2 SMF / 48-fibers 50micron OM3 standard
  - c. 096XCF-XXXXXD20 - 96-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:48-fibers OS2 SMF / 48-fibers 50micron OM4 standard
5. 192-Fiber Cable
- a. 0192XCF-XXXXXD20 - 192-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:96-fibers OS2 SMF / 96-fibers 62.5micron OM1 standard
  - b. 0192XCF-XXXXXD20 - 192-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:96-fibers OS2 SMF / 96-fibers 50micron OM3 standard
  - c. 0192XCF-XXXXXD20 - 192-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:96-fibers OS2 SMF / 96-fibers 50micron OM4 standard
6. 288-Fiber Cable
- a. 0288XCF-XXXXXD20 - 288-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:144-fibers OS2 SMF / 144-fibers 62.5micron OM1 standard
  - b. 0288XCF-XXXXXD20 - 288-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:144-fibers OS2 SMF / 144-fibers 50micron OM3 standard
  - c. 0288XCF-XXXXXD20 - 288-Fiber FREEDM indoor/outdoor gel-free cable, SST-RIBBON OFNR hybrid:144-fibers OS2 SMF / 144-fibers 50micron OM4 standard
- B. OS2
- 1. Maximum Attenuation: 0.4dB/km at 1310 nm; 0.4dB/km at 1383 nm, 0.3dB/km at 1550 nm.
  - 2. Standards:

- a. Comply with TIA-492CAAB for detailed specifications.
  - b. Comply with TIA-568-C.3 for performance specifications.
  - c. Comply with ICEA S-104-696 for mechanical properties.
- C. OM1
1. Maximum Attenuation: 3.50dB/km at 850 nm; 1.5dB/km at 1300 nm.
  2. Minimum Overfilled Modal Bandwidth-length Product: 200 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
  3. Standards:
    - a. Comply with ICEA S-83-596 for mechanical properties and ANSI/ICEA S-83-696 for mechanical properties of indoor/outdoor cables.
    - b. Comply with TIA-568-C.3 for performance specifications.
    - c. Comply with TIA-492AAAA for detailed specifications.
- D. OM3
1. Maximum Attenuation: 3.0dB/km at 850 nm; 1.0dB/km at 1300 nm.
  2. Minimum Overfilled Modal Bandwidth-length Product: 1500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
  3. Minimum effective Modal Bandwidth-length Product: 2000 MHz-km at 850 nm.
  4. Standards:
    - a. Comply with ICEA S-83-596 for mechanical properties and ANSI/ICEA S-83-696 for mechanical properties of indoor/outdoor cables.
    - b. Comply with TIA-568-C.3 for performance specifications.
    - c. Comply with TIA-492AAAC for detailed specifications.
- E. OM4
1. Maximum Attenuation: 3.0dB/km at 850 nm; 1.0dB/km at 1300 nm.
  2. Minimum Overfilled Modal Bandwidth-length Product: 3500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
  3. Minimum effective Modal Bandwidth-length Product: 4700 MHz-km at 850 nm.
  4. Standards:
    - a. Comply with ICEA S-83-596 for mechanical properties and ANSI/ICEA S-83-696 for mechanical properties of indoor/outdoor cables.
    - b. Comply with TIA-568-C.3 for performance specifications.
    - c. Comply with TIA-492AAAD for detailed specifications.
- F. Jacket:
1. Jacket Color: OS2/OM1 – Orange, OS2/OM3 – Aqua, OS2/OM4 – Violet. Coordinate cable jacket color with college prior to ordering.
  2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
  3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches
  4. Outer jacket is moisture-resistant, plenum rated, fungus-resistant and UV resistant for outdoor use

- G. Comply with TIA-492AAAA for detailed specifications and TIA-492AAAA for cables with single-mode fiber.
- H. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70

## 2.2 OPTICAL FIBER CABLE HARDWARE

- A. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors. Basis of Design: Corning or Equivalent.
  - 1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
  - 2. Fiber Optic enclosures shall be rack- or wall-mounted with respect to location and application.
    - a. Corning CCH-04U : 12-panel, 4U Rack-mount termination housing
    - b. Corning WCH-04P : 4-panel wall-mounted termination housing
  - 3. Furnish all installation components and accessories as required for a complete fiber SCS installation, including (but not limited to)
    - a. Corning UCC-001 - Universal cable clamp.
    - b. Corning CPP-SSR-KIT - Central strain-relief kit.
    - c. Corning HCF-FURC-KIT-B - Ribbon cable furcation kit.
- B. Cable Connecting Hardware:
  - 1. Comply with Optical Fiber Connector Inter-mateability Standards (FOCIS) specifications of TIA-604-2-B for Type ST connectors, TIA-604-3-B for Type SC connectors, TIA-604-10-B for Type LC connectors, TIA/EIA-604-12 for Type MT-RJ connectors, and TIA-604-5-D for Type MPO connectors. Comply with TIA-568-C.3.
  - 2. Fibers to be terminated on ribbon fiber, fusion-splice pre-terminated cassettes.
    - a. Corning CCH-CS12-59-P00RJ - CCH Pigtail Cass, 12/F SC UPC Dupx OS2 ribbon
    - b. Corning CCH-CS12-91-P00KJ - CCH Pigtail Cass, 12/F SC UPC Dupx OM1 ribbon
    - c. Corning CCH-CS12-AD-P00TJ - CCH Pigtail Cassette, 12/F shutter LC UPC Duplex OM3 Ribbon
    - d. Corning CCH-CS12-AD-P00QJ - CCH Pigtail Cassette, 12/F shutter LC UPC Duplex OM4 Ribbon

## 2.3 RACKING HARDWARE

- A. Wall-mount IT equipment Cabinets and appurtenances. Furnish and install as indicated at each site installation. Basis of Design: Chatsworth Or Equivalent.

1. Chatsworth Products 12419-748 (30" Deep Wall Mount Cabinet)
    - a. Cube-IT Plus 24x30x48 Wall mount, Plexiglas door.
    - b. Chatsworth Products 12787-548 (Or Equivalent)
      - 1) Cube-IT 26RU L-style mounting rail kit.
    - c. Chatsworth Products 12804-701
      - 1) Fan kit 115v 100CFM
    - d. Chatsworth Products 12805-201
      - 1) Filter kit, white
    - e. Chatsworth Products 12803-701
      - 1) Cube-IT Light kit
  2. Chatsworth Products 13050-723 (12" Deep Wall Mount Cabinet)
    - a. Thinline-II 36"H x 26"W x 12"D
- B. Free-standing IT equipment rack. Furnish and install as indicated at each site installation
1. Chatsworth 66353-503 (Or Equivalent)
    - a. 45RMU (7' ) x 6"-deep channel rack, two post, clear finish

#### 2.4 Fiber Optic Patch Cords

- A. Patch cords shall be furnished and installed by the contractor, in coordination with TCNJ/IT. Field surveys of facilities shall be conducted to establish required configurations and lengths.
- B. Inline adapters and couplers are not permitted.
- C. Fiber patch cords shall be constructed as follows:
  1. Patch cord assembly shall be furnished with a certification of optical performance from a post-assembly test. Field-manufactured patch cords are not acceptable.
  2. Patch cord shall be duplex product, with Red-colored thermoplastic jacket.
  3. Connector configurations are as required by the plant or equipment interconnection configuration; typical connectors are LC, SC, and ST.
  4. Connector end face polish shall be as required by the plant and equipment; typical polish is UPC (universal polish connector)
  5. Jumper connectors shall be equipped with duplexing clips (excepting ST).
  6. Each connector boot (4 boots per jumper assembly) shall be equipped with a heat-shrink band, color selected to indicate the fiber performance type, band positioned to avoid interference with the connector.



- a. Typical indicator band is 16mm long, positioned on the strain boot 1.6mm from the back of the connector when the connector is in its extreme disengaged position (e.g. just before disengaging from a mated connection).
  - b. Indicator band shall be colored to indicate fiber performance type: Yellow-OS2, Orange-OM1, Aqua-OM3, Violet-OM4.
- D. Standard patch cord lengths are indicated. Other lengths may be required to connect equipment at distances not otherwise anticipated. In any case, patch cord length shall be chosen for the minimum amount of remaining slack.
1. Within CCH fiber cabinets: 0.5-meter
  2. Between racked CCH fiber cabinets: 1-meter between two adjacent CCH panels; 2-meter between racked CCH cabinets within appx 23U (rack-units dimension); 3-meter between racked CCH cabinets 23U to 46U (typical 7-foot equipment rack).
  3. Within Data Center: 8-meter to 12-meter between disparate racks; 12-meter or longer between fiber racks and server cabinets.
  4. At FACP: 6-meter or longer between WCH and FACP – additional working slack is warranted within the FACP enclosure.

## 2.5 GROUNDING

- A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.
- B. Comply with TIA-607-B.

## 2.6 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Labels Printed, Adhesive, Self-laminating for Grounding, Outdoor Fiber and UTP Cable Sheath. Label stock color and text to provide high-contrast with cable sheath.
  1. Panduit PST-FO: Self laminating fiber tag
  2. Panduit PST-FOBLNK: Self laminating blank tag
- C. Labels, Horizontal Cable Sheath, Printed, Adhesive, Self-laminating.
  1. Label stock color and text to provide high-contrast with cable sheath. Labeling surface shall accommodate label text printed minimum 9-point font. Label shall be water-proof and self-laminating, lamination extending minimum 0.25" past label text field when installed on cable sheath. BRADY XSL-31-427-YL Vinyl self-laminating, 1"Wx1.5"L (0.5") black on yellow (UTP sheaths, typ.) BRADY XSL-21-427-YL Vinyl self-laminating, 1"Wx1.5"L (0.75") black on yellow (PLTC sheaths, typ.) Or approved equal .
- D. Labels, Ceiling grid or equipment enclosures, Printed, Adhesive, Laminated.

1. Label stock color and text to provide high-contrast with mounting surface. Label width shall be chosen to accommodate printed text readable while standing on the ground below the labeled equipment or component. P-TOUCH TZ-series laminated black text on white (for applying to dark-colored surfaces) P-TOUCH TZ-series laminated white text on black (for applying to light-colored surfaces) Or approved equal.
- E. A labeling scheme for fiber system components shall be established in coordination with College's IT department. Each fiber jumper shall be labeled at each end with the approved identifier. Identifiers shall be placed on system as-build plans.
- F. Fiber Labeling Mandrel Sleeve
  1. Mandrel sleeve shall be selected to support adhesive wrap-around labels applied radially on fiber jumpers / patch cords. Label sleeve size shall be selected to fit snugly over patch cord and maintain position without compressing cord. Positioning shall consider band radius when installed within enclosures.
  2. Panduit Flexible PVC Label Core, 1.25" length, 100pcs per package
    - a. NWSLC-2Y - 2mm Simplex jumper, 2.36mm ID, 7.11mm OD, Yellow
    - b. NWSLC-3Y - 3mm Simplex jumper, 3.175mm ID, 7.62mm OD, Orange
    - c. NWSLC-7Y - 3mm Duplex jumper, 6.86mm ID, 9.91mm OD, White
    - d. NWSLC-2Y-AQ - 2mm Simplex jumper, 2.21mm ID, 7.11mm OD, Aqua

## 2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test multimode optical fiber cables according to TIA-526-14-C and TIA-568-C.3.
- C. Factory test single mode optical fiber cables according to TIA-526-7-A and TIA-568-C.3.
- D. Factory test pre-terminated optical fiber cable assemblies according to TIA-526-14-B and TIA-568-C.3.
- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

## 2.8 TRACEABLE MULETAPE AND TRACER TERMINATOR

- A. Traceable muletape: (Neptco DT900P) Flat woven polyester with insulated 22AWG conductor, equipped with footage markings and impregnated lubricant. 1/2" nominal width, 900-lb pulling strength.
- B. Terminate traceable muletape installed in parallel with fiber cable on IDC grounding terminal. Grounding terminal is connected to Telecommunications ground point.
  1. ElectricMotion 9160 : IDC connector 22,24,26 AWG locate wire (connect to grounding point; terminate tracer wire on connector)

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
  - 2. Comply with requirements for pathways specified in Section 270528 "Pathways for Communications Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 301.
- B. General Requirements for Cabling:
  - 1. Comply with TIA-568-C.3.
  - 2. Comply with s TIA-568-C.3 for fiber, BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
  - 3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  - 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - 5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
  - 6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
  - 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

8. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
  9. In the communications equipment room, 30-foot service loop in service entry room, and 30-foot loop in communications equipment room. Install a 10-foot-long service loop on each end of cable.
  10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. Optical Fiber Cable Installation:
1. Comply with TIA-568-C.3.
  2. Cable may be terminated on connecting hardware that is rack or cabinet mounted. Refer to plans and diagrams for details.
- D. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- E. Group connecting hardware for cables into separate logical fields.
- F. Cable Lubricant: Cable pulling lubricant shall be utilized when pulling cable. All lubricant shall be compatible with the associated cable jackets and approved for use by the manufacturer
- G. Common installation attributes for fiber cable
1. Coordinate with Owner for location of termination enclosures and for location of terminal panels within new and existing enclosures.
  2. Mid-span access to fiber cable will be planned for and accommodated with sufficient slack placed in the terminal room.
    - a. Fiber counts that do not terminate at the access location shall remain contiguous; they will not be broken and re-spliced.
    - b. Fibers access shall accommodate future termination of the strands following the opposite direction of designated termination. These strands will be managed and protected in fiber enclosures.
  3. Re-incorporate and re-organize new termination panels with existing (to-remain) termination panels in new and existing enclosures in coordination with Owner.
  4. Any required system disruption or down-time must be coordinated and scheduled in advance with Owner; service-disrupting work shall be coordinated and disruption schedule(s) approved by Owner prior to commencing disruptive work.
  5. Labeling of terminal enclosures shall be coordinated with owner. IDs shall include Room, per-Cabinet, per-Panel information identifying endpoints and fiber counts.
  6. Label tags are installed on fiber cable at points of entry and exit from spaces, bulkheads, coils and loops, and proximate to terminals.
- H. Fiber Optic Patch Cords

1. Prior to connector mating, connectors and end faces shall be cleaned with a cleaning device designed for the purpose of removing contaminants such as dust and oils from optical connectors.
  2. Fiber patch cords shall be labeled with a standardized labeling scheme developed in coordination with TCNJ/IT.
    - a. Labeling scheme shall include coding to indicate connected buildings, connecting panel location and terminal position in connecting panel.
    - b. Labeling product shall be vinyl self-laminating wrap-around tags. Label text shall be mechanically generated; hand-written labels are not acceptable.
    - c. Label shall be typically installed in Flag style, where ends are pressed together and label stock folds over fiber jumper.
- I. Inter-building backbone cable.
1. Install backbone cable between buildings via designated outside plant cable pathway.
  2. Establish slack coil(s) in manholes as required in conformance with design and best practice.
  3. Each inter-building backbone cable shall be installed parallel with a traceable muletape. Traceable muletape shall be maintained continuous end-to-end in order to maintain trace continuity and trace length sequence.
  4. Establish service coils in building Entrance Facility, and Communications Equipment room. Service coil location(s) shall be coordinated with Owner.
  5. Terminate new backbone cable into designated fiber equipment enclosure.
  6. Install label tags for backbone cable and traceable muletape. Label text to be coordinated with Owner. Label tags are generally installed at both side of space bulkheads, entry and exit from spaces and pathways, prior to terminal enclosures, and on any slack or service coils.
  7. Connect traceable muletape tracer wire to IDC grounding terminal specified for the purpose.
- J. Intra-building riser cable.
1. Install cable designated for riser interconnect between or within building spaces as required and as per design.
  2. Install riser cable via designated cable pathway.
  3. Establish service coils in building Communications Equipment room and at far-end terminal. Service coil location(s) shall be coordinated with Owner.
  4. Install label tags for rise cable. Label text to be coordinated with Owner. Label tags are generally installed at both side of space bulkheads, entry and exit from spaces and pathways, prior to terminal enclosures, and on any slack or service coils.

### 3.4 FIRESTOPPING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work are limited to the following:
1. Basis of design: Wiremold-Legrand (Or Equivalent).

- B. Fire Rated Cable Pathways: Wiremold-Legrand Brand device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:
  - 1. Wiremold-Legrand – FlameStoppers FS2R-RED
  - 2. Wiremold-Legrand – FlameStoppers FS4R-RED
- C. Horizontal cable pathway locations fewer than 20 cables EMT sleeve with UL listed system for firestopping is acceptable. Caulks and sealants shall be as manufactured by STI, 3M, Nelson, or approved equivalent.
- D. Fill ratio for fire stop EMT sleeves is based on a not to exceed 40% fill capacity

### 3.5 IDENTIFICATION

- A. Labeling requires coordination with the Owner. This includes the labeling scheme as well as the materials and methods.
  - 1. Labeling must be coordinated with owner.
  - 2. Owner will provide labeling schedule.
  - 3. All labels shall remain visible, e.g. Not be painted over.
  - 4. Identify system components, wiring, and cabling complying with TIA/EIA-606-B.
- B. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- C. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. **Furnish two sets (one for demolition and one for installation) of butterfly drawings for all manholes and POEs where cables are added or removed, identifying each cable with its unique identifier. Follow convention of TIA/EIA-606-B. Furnish electronic record of all drawings.**
- D. Cable and Wire Identification:
  - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  - 2. For exposed cables residing in vertical cable trays in TRs, label each cable at intervals not exceeding 15 feet. This is in addition to labels at the connector devices and just before the terminations thereon.
  - 3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
  - 4. Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
  - 5. Label each unit and field within distribution racks and frames.

6. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service. Coordinate colors with Owner.
- E. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-B.
1. Cables use flexible vinyl or polyester that flex as cables are bent. When labels are applied to round objects such as cables, special attention shall be paid to ensure that the label will not unwrap itself due to stress relief.
  2. Cable and equipment labels shall be sized appropriately for the item to which it will be applied and the number of characters to be displayed. Typefaces smaller than 10-point shall not be used; for maximum legibility sans serif typefaces are preferred.
  3. Labels shall be appropriately colored for maximum contrast (i.e. The background color of the label must be of a contrasting color to the ceiling support). Label nomenclature shall be protected by a permanent, water-resistant, transparent top layer. Label text will be provided in a font large enough to be read from a standing position on the finished floor.
- F. Labeling system for horizontal cables
1. The following is a description of the typical labeling system anticipated to be employed for horizontal cabling installed under this contract. Details with respect to codes and identifiers will be specific to the existing installation within each building.
  2. System: Use a unique, three-syllable alphanumeric designation for each cable; label cable, faceplates, and terminations with the proper component of the designation.
    - a. First syllable identifies and locates the communications equipment room where the cable originates and is based on floor number (b=Basement, 1=First, etc.) and compass direction of room location relative to the center of the building (N, S, E, W respectively).
    - b. Second syllable identifies the primary application purpose (V for Voice or D for Data) of this cable and identifies and locates the block within the termination field on which cable terminates (letter and two-digit number).
    - c. Third syllable identifies the final room number where the cable terminates on a station jack.
    - d. Example:
      - 1) Three-syllable identifier for data cable between First floor, West closet, terminal block B13 and office 103B: 1W-DB13-103B
      - 2) Three-syllable identifier for voice cable between Basement floor, East closet, terminal block O03 and room 2: bE-VO03-002
  3. Work Area Outlet: Furnish and install wrap-around, self-laminating labels for each cable within outlet boxes. Furnish and install label within appropriate location on faceplate. Label Text at the workstation end shall be the first and second syllables of the three-syllable identifier (example: 1W-DB13, BE-VO03).
  4. Distribution Frame: Furnish and install wrap-around, self-laminating labels for cables terminated on distribution frame. Furnish and install label within labeling fixture (both sides as provided by flip label product) for termination blocks. Label text at the

termination block end shall be the second and third syllables of the three-syllable identifier (example: DB13-103B, VO02-002). Furnish and install label holders and label at the beginning of each logical field on the termination frame (WORKSTATION DATA, BUILDING MANAGEMENT, WORKSTATION VOICE, VOICE RISER XXX-YYY)

5. Patch Cords: For patch cords installed within scope, furnish and install wrap-around, self-laminating labels on both ends. Label Text at each end shall be the first, second and third syllables of the three-syllable identifier (example: 1W-DB13-103B, BE-VO03-002).
- G. Labeling for riser, grounding, and backbone cables, within buildings and within outside plant, shall be installed using self-laminating cable tags (e.g. Panduit). Label texts shall be printed on adhesive label stock, applied to the cable tag, and sealed completely beneath the lamination. Labels shall be installed where cables enter and exit pulling points (e.g. manholes, pullboxes, etc.), on all slack or service coils, where cables pass through wall, floor, bulkhead or enclosure, penetrations, and before termination enclosures.
- H. Labeling for conduits feeding enclosed spaces shall be applied within 6" of the end of the conduit using self-laminating cable tags (e.g. Panduit), at both ends. If conduit terminates above dropped ceiling, label shall also be applied to ceiling support grid. Separate label codes shall be developed for conduit segments separated by intermediate pullboxes/enclosures in order to indicate the presence and location of such enclosures. Label code shall include terminating room numbers. Coordinate with Owner.
- I. Work area outlets and equipment enclosures located above the ceiling, such as are provided for cameras, wireless access points, or display units, will be identified by a machine printed label permanently attached to the ceiling grid.
- J. The Contractor shall apply labels as detailed on drawings and as identified on cable pull schedules to each cable, patch panel, termination block and faceplate as required
- K. Labeling for fiber patch cords shall be applied within 6" of the end of the patch cord. Label texts shall be printed on self-laminating adhesive labels. Labeling text shall indicate the loop segment this patch cord connects (e.g. Inter-building), and the endpoints of the patch cord (e.g. panel to transceiver). Indexing shall be included to differentiate multiple patch cords connecting similar elements (e.g. -1, -2, -3, etc.). Where wrap-around labels do not fit the cord (e.g. label field overlaps itself), install a label wrap mandrel on the cord to support the label. Mandrel shall be sized to maintain position on the cord without excess compression.

### 3.6 SOURCE QUALITY CONTROL

- A. Factory test multimode and singlemode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-C. Include 526-7 for single-mode cable.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Test all optical fiber cable for length prior to removing from spool.



### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Tests and Inspections:
  - 1. Visually inspect optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-C.1.
  - 2. Visually confirm cable category marking of outlets, cover plates, outlet/connectors, and patch panels.
  - 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 4. Replace any cable whose cable jacket is be kinked, scored, twisted or otherwise damaged.
  - 5. Optical Fiber Cable Tests:
    - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    - b. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-C.1. Link End-to-End Attenuation Tests:
    - c. Multimode backbone link measurements: Test at 850 and 1300 nm in 1 direction according to TIA/EIA-526-14-C, Method B, One Reference Jumper. Repeat test in reverse direction as well.
    - d. Singlemode backbone link measurements: Test at 1310 and 1550 nm in 1 direction according to TIA/EIA-526-7-A, Method B, One Reference Jumper. Repeat test in reverse direction as well.
  - 6. Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-C.1.
    - a. Provide bi-directional OTDR and OLTS testing.
  - 7. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM. Data shall also be submitted in .pdf format as well as the raw data from the testing instrument. Provide any software required to read this data to the Owner at no additional charge. Software shall include permanent licensing.
  - 8. Remove and replace cabling that is physically damaged or where test results indicate that they do not comply with specified requirements.
  - 9. End-to-end cabling will be considered defective if it does not pass tests and inspections
- E. Prepare test and inspection reports.

END OF SECTION 271323

SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Category 6 twisted pair cable.
  - 2. Twisted pair cable hardware, including plugs and jacks.
  - 3. Cabling identification products.
  - 4. Source quality control requirements for twisted pair cable.

1.3 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. LAN: Local area network.
- G. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- H. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.
- I. RCDD: Registered Communications Distribution Designer.
- J. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- K. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. S/FTP: Overall braid screened cable with foil screened twisted pair.
- M. S/UTP: Overall braid screened cable with unscreened twisted pairs.

- N. UTP: Unscreened (unshielded) twisted pair.

#### 1.4 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
  - 1. TIA-568-C.1 requires that a minimum of two equipment outlets be installed for each work area.
  - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
  - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Substitutions
  - 1. All functions and features specified herein are to be provided by the contractor. Where specific manufacturer's names and model numbers are specified, such identification is to identify the expected performance parameters and to functionally define the specific product requirement.
  - 2. Where a contractor intends to provide goods other than those specifically identified, such "equivalent" items must be clearly identified in the submittals. "Equivalent" items must include written certification from the manufacturer of the substitute item stating the equivalency of each and every substituted item relative to the specified items in regard to features, function, performance and future expansion capability.
  - 3. Contractors wishing to provide "equivalent" products for specified devices may be required to demonstrate the equivalency of the proposed substitute items to the Owner, at the contractor's expense. Such proof of equivalency, in addition to the manufacturer's letter as noted above, may include the following:
    - a. An on-site, side-by-side sample demonstration of both the specified and proposed substitute items.
    - b. A formal bipartisan, laboratory test report comparing the technical performance of each and every proposed substitute, versus specified item.
    - c. Such test reports for IT System components will include a spreadsheet comparison of all critical dimensions, performance characteristics, compatibilities, etc.

- d. The responsibility of proving the equivalency of substitute products with respect to the specified products shall lie solely with the contractor.
  - e. All costs associated with providing information or performing the above outlined tests and comparisons required to confirm the equivalency of substitute products will be at the sole expense of the contractor. Such costs may include but are not limited to:
    - 1) Independent laboratory tests
    - 2) Cost of equipment items for demonstration of specified and proposed substitute items
    - 3) Contractor incurred travel costs and miscellaneous expenses
    - 4) Professional Services Fees (architects, engineers and consultants) charged to the Owner as a result of time charged to participating in the review of proposed substitute items.
  - 4. All requests for substitution shall be made to the Engineer, accompanied by a product data sheet submittal as outlined in the Specifications. The Engineer will distribute documentation to the Owner for review.
  - 5. The Engineer and Owner have no obligation to consider or approve requests for substitution after award of contract.
- C. Shop Drawings: Reviewed and stamped by RCDD.
- 1. Revise paragraphs below to reflect Owner's requirements. Retain one of two "System Labeling Schedules" subparagraphs below.
  - 2. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
  - 3. Cabling administration drawings and printouts.
  - 4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
    - a. Telecommunications rooms plans and elevations.
    - b. Telecommunications pathways.
    - c. Telecommunications grounding system.
    - d. Telecommunications conductor drop locations.
    - e. Typical telecommunications details.
- D. Twisted pair cable testing plan.
- E. Qualification Data: For RCDD, installation supervisor, and field inspector.
- F. Product Certificates: For each type of product.
- G. Source quality-control reports.
- H. Field quality-control reports.
- I. Qualifications for CAT6 UTP Ethernet installations.
- 1. Installer Certificates

- a. BICSI RCDD certificate and registration number.
- b. Tyco Electronics ND&I Member (Silver or Better).

J. Installer Qualifications

1. Provide the following to demonstrate adequate experience and minimum qualifications.
  - a. COMMSCOPE/TE Trunet Certificate
2. Installing company shall be certified by manufactures in aspects of design, installation and testing of optical and Category 6 metallic premise distribution systems, be a manufactures Value Added Reseller (VAR) in good standing, with a current, active certification that has been continuous for at least the last 24 months. This applies to both the COMMSCOPE/TE and Corning certifications.
3. Installation Supervision: Installation shall be under the direct supervision of Level 2 Installer and manufactures certified installer, who shall be present at all times when Work of this Section is performed at Project site. One half of remainder of the crew shall be at a minimum Registered Technicians by manufacture as part of their Certified Installer Program.
4. Installer shall provide project information detailing a minimum of five (5) years of experience on similar Structured Cabling Systems (SCS).

K. Prequalification Warrantee.

1. Recently dated (within one year from submittal date) support letter from manufacturer stating that the supplying contractor is Authorized to obtain for the owner the Extended Warranty for Cabling System and the Extended Warranty for System Assurance.
2. Prequalification shall include demonstrating 24 months continuous active certification in the extended warranty program, from the date of the submittal.

L. Prequalification Certificate.

1. Copy of the installing technician(s) certificate of completion from the manufacturer's training school for the equipment being provided.

1.6 CLOSEOUT SUBMITTALS

M. At the completion of the installation, but before Final Acceptance, provide for review and approval the following, in compliance with Closeout Procedures.

1. Operation and Maintenance Manuals:
  - a. Equipment manufacturer's operation and service manuals for each make and model of equipment. Submit in both hard-copy and electronic (.pdf) formats.
2. Warranty
  - a. Provide list and dates of activation of equipment warranties

- b. Provide original manufacturers' certificate of SCS extended warranty.
- 3. As-built Drawings
  - a. Include contractor generated (mark-up of contract documents is not acceptable) digital record diagrams for all systems including, but not limited to:
    - 1) Floor Plans, including final outlet locations and identification.
    - 2) Cable identification spreadsheet. Include all relevant data, including cable identification, make, color, source room, destination room, termination location, etc.
- 4. Testing Results
  - a. Submit hard-copy and electronic (pdf) test result data.
  - b. Submit copy of native tester results datafile, and copy of reader software on USB. Datafiles shall be organized by link segment, organization readily apparent through file listing.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Faceplates: Three of each type.
  - 2. Jacks: Five of each type.
  - 3. Plugs: Ten of each type.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  - 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
  - 2. Installation Supervision: Installation shall be under the direct supervision of Technician, who shall be present at all times when Work of this Section is performed at Project site.
  - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
  - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test each pair of twisted pair cable for open and short circuits.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568-C.1, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-D.
- C. Grounding: Comply with TIA-607-B.

### 2.2 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
  - 1. Communications, Plenum Rated: Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway or Type CMP in listed cable routing assembly.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 50 or less.
- C. RoHS compliant.

### 2.3 CATEGORY 6 TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6 cable at frequencies up to 250MHz.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. CommScope, Inc.
  - 2. Or Equivalent.
- C. Indoor Horizontal Cabling basis of design: COMMSCOPE/TE TE620P-BLxx blue sheath for data)
- D. Standard: Comply with NEMA WC 66/ICEA S-116-732 and TIA-568-C.2 for Category 6 cables.
- E. Conductors: 100-ohm, 23 AWG solid copper.
- F. Shielding/Screening: Unshielded twisted pairs (UTP).
- G. Cable Rating: Plenum (CMP).



- H. Jacket: Blue thermoplastic.

## 2.4 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. CommScope Inc.
  - 2. Or Equivalent.
- C. General Requirements for Twisted Pair Cable Hardware:
  - 1. Comply with the performance requirements of Category 6 .
  - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
  - 3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain twisted pair cable hardware from single source from single manufacturer.
- E. Connecting Blocks: HighBand-style for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare.
  - 1. 8-Pair Category-6 Termination Block
    - a. CommScope 64685060-08 - Highband® Ultim8 Disconnection Module, 8-pair, with jumper rings, Category 6
  - 2. Label Holder
    - a. CommScope 6089-2-015-01: Type 105 flip label holder
  - 3. Termination block mounting bracket
    - a. COMMSCOPE 6657-2-165-40: UMS bracket - black
- F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
  - 1. Number of Terminals per Field: One for each conductor in assigned cables.
- G. Patch Cords: Factory-made, four-pair cables in lengths as required for connections; terminated with an eight-position modular plug at each end.
  - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
  - 2. CommScope TP6TB-RDxx - Ultim8 plug, 4-pair CAT6 patch cord, 568B, color Red (xx is length - 04,07,10,15,25 in feet)
    - a. Patch cords required for testing and for installation.
    - b. Patch cord length to be coordinated with Owner.
- H. Faceplates & Blanks

1. CommScope 2111041-1 - 2-Gang, 6-port faceplate, Almond
2. CommScope 6645-1-160-02 - Blank Insert

I. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standard: Comply with TIA-568-C.2.
4. Marked to indicate transmission performance.
5. CommScope 760237657 - Uni UKJ600 Jack, CAT6, Red

J. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

## 2.5 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

## 2.6 GROUNDING

- A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.
- B. Comply with TIA-607-B.

## 2.7 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA-568-C.1.
- C. Factory test twisted pair cables according to TIA-568-C.2.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, attics, and gypsum board partitions

where unenclosed wiring method may be used. Conceal raceway and cables, except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Section 270528 "Pathways for Communications Systems."

- B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

### 3.2 INSTALLATION OF PATHWAYS

- A. Comply with Section 270528 "Pathways for Communications Systems."
- B. Comply with Section 270529 "Hangers and Supports for Communications Systems."

### 3.3 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
1. Comply with TIA-568-C.0, TIA-568-C.1, and TIA-568-C.2.
  2. Comply with BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section.
  3. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
  4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  6. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
  7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" Section. Use lacing bars and distribution spools.
  8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
  9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

10. Pulling Cable: Comply with BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" Section. Monitor cable pull tensions.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

### 3.4 FIRESTOPPING

- A. Comply with requirements in Section 078413 "Penetration Firestopping."

- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with "Firestopping Systems" Article in BICSI's "Telecommunications Distribution Methods Manual."

### 3.5 GROUNDING

- A. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- B. Comply with TIA-607-B and NECA/BICSI-607.

### 3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-B.
  - 1. Administration Class: Class 2.
  - 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-B for Class 2 level of administration, including optional identification requirements of this standard.
- C. Refer to Specification 271323 for labeling products approved for use on CAT6 UTP cable systems. Coordinate labeling with Owner.
- D. Cable and Wire Identification:
  - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  - 2. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
    - b. Label each unit and field within distribution racks and frames.
  - 3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:

1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA-568-C.1.
  2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - a. Test instruments shall meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual,". Data shall also be submitted in .pdf format as well as the raw data from the testing instrument. Provide any software required to read this data to the Owner at no additional charge. Software shall include permanent licensing.
- D. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.
  1. Submit hard-copy and electronic (pdf) test result data.
- G. Structured Cable System Warranty
  1. Provide list and dates of activation of equipment warranties
  2. Provide original manufacturers' certificate of SCS extended warranty.

END OF SECTION 271513

SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. RS-232 cabling.
  - 2. RS-485 cabling.
  - 3. Low-voltage control cabling.
  - 4. Control-circuit conductors.
  - 5. Fire alarm wire and cable.
  - 6. Identification products.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. IDC: Insulation displacement connector.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- D. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.
- D. Installer Qualifications

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL.

1. Minimum NICET Level II or greater certified technician.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  1. Test each cable for open and short circuits.

#### 1.7 FIELD CONDITIONS

- A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
  1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### 2.2 RS-232 CABLE

- A. Standard Cable: NFPA 70, Type CM.
  1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  2. Polypropylene insulation.
  3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
  4. PVC jacket.
  5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
  6. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated Cable: NFPA 70, Type CMP.
  1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  2. Plastic insulation.
  3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
  4. Plastic jacket.
  5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
  6. Flame Resistance: Comply with NFPA 262.



## 2.3 RS-485 CABLE

- A. Standard Cable: NFPA 70, Type CM or CMG.
  - 1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
  - 2. PVC insulation.
  - 3. Unshielded.
  - 4. PVC jacket.
  - 5. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated Cable: NFPA 70, Type CMP.
  - 1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
  - 2. Fluorinated ethylene propylene insulation.
  - 3. Unshielded.
  - 4. Fluorinated ethylene propylene jacket.
  - 5. Flame Resistance: NFPA 262, Flame Test.

## 2.4 LOW-VOLTAGE CONTROL CABLE

- A. Paired Cable: NFPA 70, Type CMG.
  - 1. One pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
  - 2. PVC insulation.
  - 3. Unshielded.
  - 4. PVC jacket.
  - 5. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
  - 1. One pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
  - 2. PVC insulation.
  - 3. Unshielded.
  - 4. PVC jacket.
  - 5. Flame Resistance: Comply with NFPA 262.

## 2.5 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway Type XHHN, complying with UL 44, in raceway.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway power-limited cable, complying with UL 83, concealed in building finishes power-limited tray cable, complying with UL 83, in cable tray Type XHHN, complying with UL 44, in raceway.

- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

## 2.6 FIRE ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Comtran Corporation.
  - 2. Draka Cableteq USA.
  - 3. Genesis Cable Products; Honeywell International, Inc.
  - 4. Rockbestos-Suprenant Cable Corp.
  - 5. West Penn Wire.
  - 6. Or Equivalent.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No.18 AWG size as recommended by system manufacturer.
  - 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
  - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
  - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
  - 3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NRTL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

## 2.7 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Brady Worldwide, Inc.
  - 2. HellermannTyton North America.
  - 3. Kroy LLC.
  - 4. Panduit Corp.
  - 5. Or Equivalent.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

- C. Comply with requirements in "Identification for Electrical Systems."

## 2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Cable will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF HANGERS AND SUPPORTS

- A. Comply with requirements in "Hangers and Supports for Electrical Systems" for installation of supports for cables.

### 3.2 WIRING METHOD

- A. Install wiring in metal pathways and wireways.
  - 1. Minimum conduit size shall be 3/4 inch (21 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.
  - 2. Comply with requirements in "Pathways for Electronic Safety."
- B. Install cable, concealed in accessible ceilings, walls, and floors when possible.
- C. Wiring within Enclosures:
  - 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
  - 2. Install lacing bars and distribution spools.
  - 3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
  - 4. Install conductors parallel with or at right angles to sides and back of enclosure.
  - 5. Mark each terminal according to system's wiring diagrams.
  - 6. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.
- C. General Requirements for Cabling:

1. Cables may not be spliced.
2. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
3. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
4. Pulling Cable: Comply with manufacturer recommendations for allowable cable pulling tension. Monitor cable pull tensions.

D. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Separation from EMI Sources:

1. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches
2. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
3. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
4. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
5. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

### 3.4 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in metal raceway according to "Raceways and Boxes for Electrical Systems."
  1. Install plenum cable in environmental air spaces, including plenum ceilings.

2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is permitted.
3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

### 3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 12 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 12 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 CONNECTIONS

- A. Comply with requirements in "Digital, Addressable Fire-Alarm System for connecting, terminating, and identifying wires and cables.

3.7 FIRESTOPPING

- A. Comply with requirements in "Penetration Firestopping."

3.8 GROUNDING

- A. For low-voltage wiring and cabling, comply with requirements in Section 280526 "Grounding and Bonding."

3.9 IDENTIFICATION

- A. Identify system components, wiring, and cabling. Comply with requirements for identification specified in "Identification for Electrical Systems."

3.10 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections :
  1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  2. Inspect for correct identification and arrangement.
  3. Inspect cable jacket and condition.
  4. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
  5. Continuity test on each conductor and cable.
  6. Provide installation testing per NFPA 72 requirements.
- B. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Submit hard-copy and electronic (pdf) test result data.

END OF SECTION 285013

SECTION 280526 - GROUNDING AND BONDING FOR ELECTRONIC SAFETY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Grounding conductors.
  - 2. Grounding connectors.

1.3 DEFINITIONS

- A. Signal Ground: The ground reference point designated by manufacturer of the system that is considered to have zero voltage.

1.4 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Harger Lightning and Grounding.
  - 2. Panduit Corp.
  - 3. Tyco Electronics Corp.
  - 4. Or Equivalent.
- B. Comply with UL 486A-486B.
- C. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

## 2.2 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Burndy; Part of Hubbell Electrical Systems.
  - 2. Chatsworth Products, Inc.
  - 3. Harger Lightning and Grounding.
  - 4. Panduit Corp.
  - 5. Tyco Electronics Corp.
  - 6. Or Equivalent.
- C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
  - 1. Electroplated tinned copper, C and H shaped.
- D. Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch centers for a two-bolt connection to the busbar.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."
  - 1. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
  - 2. Bond shields and drain conductors to ground at only one point in each circuit.
- B. Signal Ground:
  - 1. Establish the signal ground and label that location as such.
  - 2. Bond the signal ground to the alternating-current (ac) power system service by connecting to one of the following listed locations, using insulated No. 6 AWG, stranded, Type THHN wire:
    - a. Main ground bar (location of service ground) located in the building electrical service equipment or panel. A continuous conductor shall be routed from this service ground bar to the fire alarm control panel.
- C. Comply with NECA 1.



- D. Telecommunication grounding system shall not be utilized for sourcing Fire Alarm System Grounds.

### 3.2 APPLICATION

- A. Conductors: Install solid conductor for No. 8 AWG and smaller and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Grounding and Bonding Conductors:
  - 1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.
  - 2. Install without splices.
  - 3. Support at not more than 36-inch intervals.

### 3.3 CONNECTIONS

- A. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- B. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
  - 1. Use crimping tool and the die specific to the connector.
  - 2. Pretwist the conductor.
  - 3. Apply an antioxidant compound to all bolted and compression connections.
- C. Shielded Cable: Bond the shield of shielded cable to the signal ground.

### 3.4 Identification

- A. Provide a cable tag on both ends of the cable.
- B. Each tag shall contain information as to where the other end is located – far end tagging (equipment, room number, panel, system, etc)

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
  - 1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 280526

## SECTION 280528 - PATHWAYS FOR ELECTRONIC SAFETY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Metal conduits, tubing, and fittings.
  - 2. Metal wireways and auxiliary gutters.
  - 3. Boxes and enclosures.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For surface pathways, wireways and fittings, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Structural members in paths of pathway groups with common supports.
  - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Source quality-control reports.

### PART 2 - PRODUCTS

#### 2.1 METAL CONDUITS, TUBING, AND FITTINGS

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

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit.
3. Alpha Wire Company.
4. Anamet Electrical, Inc.
5. Electri-Flex Company.
6. O-Z/Gedney.
7. Picoma Industries.
8. Republic Conduit.
9. Robroy Industries.
10. Southwire Company.
11. Thomas & Betts Corporation.
12. Wheatland Tube Company.
13. Or Equivalent.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. EMT: Comply with ANSI C80.3 and UL 797.

E. FMC: Comply with UL 1; zinc-coated steel or aluminum.

F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Fittings for EMT:

- a. Material: Steel.
- b. Type: Setscrew.

2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 467, rated for environmental conditions where installed, and including flexible external bonding jumper.

H. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

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

1. Cooper B-Line, Inc.
2. Hoffman.
3. Mono-Systems, Inc.
4. Square D.

5. Or Equivalent.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4 unless otherwise indicated, and sized according to NFPA 70.
  1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type or Screw-cover type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

### 2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Adalet.
  2. Cooper Technologies Company; Cooper Crouse-Hinds.
  3. EGS/Appleton Electric.
  4. Erickson Electrical Equipment Company.
  5. Hoffman.
  6. Lamson & Sessions; Carlon Electrical Products.
  7. Milbank Manufacturing Co.
  8. Mono-Systems, Inc.
  9. O-Z/Gedney.
  10. Quazite:Hubbell Power Systems, Inc.
  11. RACO; Hubbell.
  12. Thomas & Betts Corporation.
  13. Wiremold / Legrand.
  14. Or Equivalent.
- B. General Requirements for Boxes, Enclosures, and Cabinets:
  1. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- H. Device Box Dimensions: 4-inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- I. Gangable boxes are not allowed.
- J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

### PART 3 - EXECUTION

#### 3.1 PATHWAY APPLICATION

- A. Outdoors: Apply pathway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC.
  - 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply pathway products as specified below unless otherwise indicated:
  - 1. Exposed, Not Subject to Physical Damage: EMT.
  - 2. Exposed, Not Subject to Severe Physical Damage: EMT identified for such use.
  - 3. Exposed and Subject to Severe Physical Damage: GRC.
  - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT or metal clad cable.
  - 5. Exposed on existing masonry walls in finished areas: Surface Metal Raceway.
  - 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric-Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  - 7. Damp or Wet Locations: GRC.
  - 8. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: EMT or metal clad cable.
  - 9. Boxes and Enclosures: NEMA 250, Type 1.
- C. Minimum Pathway Size: 3/4-inch (21-mm) trade size. Minimum size for optical-fiber cables is 1 inch (27 mm).
- D. Pathway Fittings: Compatible with pathways and suitable for use and location.
  - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
  - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

### 3.2 INSTALLATION

- A. Comply with NECA 1, NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.
- B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
- C. Complete pathway installation before starting conductor installation.
- D. Comply with requirements in "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications wiring conduits for which only two 90-degree bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- H. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT for pathways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.
- K. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to conduit assembly to assure a continuous ground path.
- M. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- N. Install pull wires in empty pathways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground pathways designated as spare above grade alongside pathways in use.

- O. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install pathway sealing fittings according to NFPA 70.
- P. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service pathway enters a building or structure.
  - 3. Where otherwise required by NFPA 70.
- Q. Expansion-Joint Fittings:
  - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
  - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    - d. Attics: 135 deg F temperature change.
  - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
  - 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  - 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- R. Flexible Conduit Connections: Comply with NEMA RV 3. Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
  - 1. Use LFMC in damp or wet locations subject to severe physical damage.
  - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.



- S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- T. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### 3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRONIC SAFETY PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in "Sleeves and Sleeve Seals for Electronic Safety Pathways and Cabling."

### 3.4 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in "Penetration Firestopping."

### 3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 280528

TCNJ –FIRE ALARM CABLE INFRASTRUCTURE,  
HARDWARE AND SOFTWARE

dlb # 47211 / 05-20

SECTION 280544 - SLEEVES AND SLEEVE SEALS FOR ELECTRONIC SAFETY PATHWAYS  
AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

- C. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- D. Sleeves for Rectangular Openings:
  - 1. Material: Galvanized-steel sheet.
  - 2. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
    - b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

## 2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. CALPICO, Inc.
    - c. Metraflex Company (The).
    - d. Pipeline Seal and Insulator, Inc.
    - e. Proco Products, Inc.
    - f. Or Equivalent.
  - 2. Sealing Elements: EPDM Nitrile (Buna N) rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 3. Pressure Plates: Carbon steel.
  - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

## 2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Presealed Systems.
    - b. Or Equivalent.

## 2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## 2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
  - 2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Silicone Foams: Multicomponent, silicone-based, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

## PART 3 - EXECUTION

### 3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in "Joint Sealants."
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at pathway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, apply to this Section.

1.2 SUMMARY

- A. This section of the specifications includes the furnishing, installation, connection and programming of the campus-networked fire alarm equipment to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.
- B. The system shall include all necessary hardware, software and peripheral devices to perform the following functions, but not limited to:
  - 1. Fire-alarm control unit.
  - 2. Manual fire-alarm boxes.
  - 3. System smoke detectors.
  - 4. Duct smoke detectors.
  - 5. Heat detectors.
  - 6. Notification appliances.
  - 7. Device guards.
  - 8. Magnetic door holders.
  - 9. Remote annunciator.
  - 10. Addressable interface device.
  - 11. Digital alarm communicator transmitter.
  - 12. Network communications.
  - 13. Integration with and status monitoring of related systems including:
    - a. Fire Pump
    - b. Fire Protection Suppression Systems
    - c. Security, communications and information technology systems.
- C. The system shall include all required hardware, raceways, interconnecting wiring and software to accomplish the requirements of this specification and the contract drawings, whether or not specifically itemized herein. All devices installed outdoors or within areas exposed to unconditioned spaces or wet locations shall be listed for “outdoor use”.
- D. All equipment furnished shall be new and the latest state-of-the-art products of a single manufacturer.
- E. Provide the services of qualified system designers to generate shop drawings, and field technicians to provide installation oversight during construction and system startup. Technicians

shall inspect, program, test and make any necessary adjustments to the completed system, to ensure compliance with the manufacturer's recommended practices and the approved shop drawings.

### 1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. FM: FM Global (Factory Mutual).
- D. HLI: High Level Interface.
- E. NICET: National Institute for Certification in Engineering Technologies.
- F. PC: Personal computer.
- G. UL: Underwriters Laboratories.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including furnished options and accessories.
  - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
  - 2. Include rated capacities, operating characteristics, and electrical characteristics.
  - 3. Catalog manufacturer's data sheets for all equipment, accessories and wiring with all applicable components being submitted for this project clearly noted.
- B. Shop Drawings: The shop drawing submittal shall clearly indicate all proposed equipment and devices (type and quantity), with wiring diagrams, detailed operational sequences, and interfaces to related systems. They shall be prepared in accordance with NFPA 72 recommended practices and include the following:
  - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
  - 2. Include plans, elevations, sections, details, and attachments to other work.
  - 3. Complete point-to-point riser diagrams showing all equipment including size, type, number and reference designations for all circuits and devices. Each device shall be shown with address numbers or any other required field device settings including candela rating of notification appliances. Riser diagrams shall consist of:
    - a. A complete one-line Network Riser Diagram showing interconnected control panels and intended room locations.



4. Detailed point-to-point riser diagram(s) showing all equipment, circuits and devices connected to each fire alarm control panel.
  5. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
  6. Detail assembly and support requirements. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  7. Include voltage drop calculations for notification-appliance circuits.
  8. Include battery-size calculations.
  9. Include input/output matrix. Provide a complete sequence of operation in the form of an NFPA Input/Output programming matrix for the entire system as shown in NFPA 72. The matrix shall reflect each unique programmed sequence, whether the sequence is initiated by an individual or common group of similar devices.
  10. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
  11. Include performance parameters and installation details for each detector.
  12. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
  13. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
  14. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    - b. Locate detectors according to manufacturer's written recommendations.
  15. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- C. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the college.
  2. Shop Drawings shall be prepared by persons with the following qualifications:
    - a. NICET-certified, fire-alarm technician; Level II minimum.
    - b. Licensed or certified by authorities having jurisdiction.

- D. Delegated-Design Submittal: For notification appliances and carbon monoxide, smoke, and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for DCA submission.
  - 1. Drawings showing the location of each notification appliance and detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
  - 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
  - 3. Indicate audible appliances required to produce square wave signal per NFPA 72.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:
    - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
    - b. Provide "Fire Alarm System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
    - d. Riser diagram.
    - e. Device addresses.
    - f. Record copy of site-specific software.
    - g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
      - 1) Equipment tested.
      - 2) Frequency of testing of installed components.
      - 3) Frequency of inspection of installed components.
      - 4) Requirements and recommendations related to results of maintenance.
      - 5) Manufacturer's user training manuals.
    - h. Manufacturer's required maintenance related to system warranty requirements.

- i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
  - j. Provide programming of new devices into existing Fire Alarm System where applicable, including all new addressable devices.
  - k. Provide all testing and calculations in PDF form
  - l. Testing reports and calculations shall be maintained centrally in pdf format as well as locally at each individual building FACP
- B. Fiber inter-connection performance data taken bi-directional at each panel connection including:
1. Inert Panel Link OTDR Traces
  2. Inter-Panel Link Reports, including panel transceiver link level reports.
  3. Channel loss design calculations
  4. Channel loss measurements
  5. Link loss and margin calculations
- C. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
  2. Program Software Backup: On USB thumb drive, complete with data files.
  3. Device address list.
  4. Printout and PDF copy of software application and graphic screens.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Smoke Detectors: Quantity equal to 2 percent of amount of each type installed, but no fewer than one unit of each type.
  2. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
  3. Heat Detectors: Quantity equal to 2 percent of amount of each type installed
  4. Carbon Monoxide Detectors: Quantity equal to 2 percent of each type installed
  5. Notification Appliances (Speaker, Strobe, Combination): Quantity equal to 2 percent of each type installed
  6. Keys and Tools: One extra set for access to locked or tamper proofed components.
  7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- B. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

- C. State and Local Building Codes as adopted and/or amended by The Authority Having Jurisdiction, ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.
- D. The manufacturer shall provide evidence of successfully installed similar fire detection and notification systems on comparable size and scope.
- E. The manufacturer shall have in-house engineering and project management capability consistent with the requirements of this project. Factory trained representatives of the system manufacturer shall perform the detailed engineering of the system.
- F. The equipment supplier shall have a licensed fire protection engineer on staff to assist with all aspects of the installation including interfacing with the local AHJ.
- G. A technician from the equipment supplier shall supervise the installation, software documentation, adjustment, preliminary testing, final testing and certification of the system.

#### 1.9 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning and submit report to the college.
- B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.
- C. Installed products or materials shall be free from any damage including, but not limited to, physical insult, dirt and debris, moisture, and mold damage.

#### 1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building. A fire watch conforming with the requirements of the AHJ must be provided when the fire alarm system is not in operation.

#### 1.11 WARRANTY

- A. All material and equipment furnished under this contract shall be free from defects and shall remain so for the periods of time indicated per the bid proposal worksheet.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
  - 1. Manual stations.
  - 2. Heat detectors.
  - 3. Smoke detectors.
  - 4. Duct smoke detectors.
  - 5. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
  - 1. Continuously operate alarm notification appliances.
  - 2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises Life Safety Management network control panels, and remote annunciators.
  - 3. Transmit an alarm signal to the remote alarm receiving station.
  - 4. Release fire and smoke doors held open by magnetic door holders.
  - 5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
  - 6. Close smoke dampers in air ducts of designated air-conditioning duct systems.
  - 7. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
  - 1. Valve supervisory switch.
  - 2. Independent fire-detection and -suppression systems.
  - 3. User disabling of zones or individual devices.
  - 4. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices (trouble indicated at FACP and LSMS):
  - 1. Open circuits, shorts, and grounds in designated circuits.
  - 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.

3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the LSMS.

## 2.3 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72 installation methods, all contract documents and specification requirements.
1. The FACP and auxiliary power panels shall provide power, annunciation, supervision and control for the system.
  2. The voice evacuation system amplifiers shall be configured as distributed audio. Provide 8 channels one way voice communications for selective, manual and pre-recorded tones and voice instructional messaging throughout the facility. (in applicable buildings)
  3. Strobes shall be synchronized throughout the entire building.
  4. Provide a dedicated smoke management graphical panel with firefighter's override functions and system status lights.
  5. Provide electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control panel.
  6. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. The system shall be designed such that in the event of a network communications failure, any remaining interconnected panels will operate as a sub-network and any isolated panels will operate in standalone mode. Upon communications failure, a trouble condition will be reported across the network and the disconnected panel shall continue to function in standalone mode.

## 2.4 FIRE-ALARM CONTROL UNIT

- A. Manufacturers: Subject to compliance with requirements, provide products by the following or approved equal:
1. Honeywell Building Solutions
  2. Simplex
  3. Siemens Intelligent Infrastructure

4. Or Equivalent

B. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
  - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
  - b. Include a real-time clock for time annotation of events on the event recorder and printer.
  - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
  - d. The FACP shall be listed for connection to a central-station signaling system service.
  - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
  - f. The FACP shall have the following internal intelligent sensing functional capabilities:
    - 1) Drift compensation and smoothing
    - 2) Maintenance warnings
    - 3) Sensitivity adjusting
    - 4) Cooperating multi-detector sensing
2. Primary Power: The control panels, transponders, NAC power booster panels, system workstation, and any other fire alarm equipment shall receive their primary power from a dedicated 120VAC disconnect circuit.
  - a. The circuit must be properly sized and protected in accordance with NEC requirements.
  - b. AC 120V surge protector
    - 1) 20A parallel configuration
    - 2) 50KA max surge current
    - 3) DITEK or Equivalent.
  - c. This requirement does not limit that one dedicated branch circuit to serving only one power supply within a system. The dedicated branch circuit could supply several fire alarm power supplies within a control unit or within multiple interconnected control units that serve the signaling system.
  - d. The dedicated circuit can be supplied from any properly installed electrical panel board or sub-panel.
  - e. The circuit disconnecting means shall be labeled 'FIRE ALARM' and any other local identification requirements. Its location must be listed at the point of connection to the fire alarm control equipment. Provide a dedicated breaker lock.

3. Secondary Power Supply: When the primary AC power is lost, the system shall automatically switch to the secondary power supply.
  - a. The control panels, transponders, and NAC power booster panels shall receive their secondary power from batteries.
  - b. Battery shall be of the sealed lead-acid, maintenance free type, 24-volt nominal, suitable for life safety application.
  - c. Provide sufficient capacity to operate the complete alarm system in quiescent standby load (system operating in a non-alarm condition) for a period of 24 hours and shall have sufficient capacity to operate all alarm notification appliances and all other connected loads for a period of 5 minutes.
  - d. Batteries shall be secured in seismic areas 2B, 3, or 4 as defined by the Building Code.
4. System Enclosure: The control unit shall be housed in a cabinet suitable for both recessed and surface mounting. Cabinet and front shall be corrosion protected, given a rust resistant prime coat, and manufacturer's standard finish. The outer doors shall be capable of being a left hand open or a right hand open. System enclosure doors shall provide where required ventilation for the modules or cards in the enclosure.
  - a. Enclosure needed to hold all the cards and modules as specified with at least 30% spare capacity for extra cards.
  - b. Provide system enclosure for all amplifiers. Where required by the manufacturer, provide means for venting heat from the enclosure either by having enclosure sides and top vented or the doors vented.
- C. Alphanumeric Display and System Controls: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
  1. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.
- D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
  1. Pathway Class Designations: NFPA 72, Class B.
  2. Install no more than 50 addressable devices on each signaling-line circuit.
  3. Serial Interfaces:
    - a. One dedicated RS 485 port for central-station operation using point ID DACT.
- E. Notification-Appliance Circuit:
  1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
  2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.



3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- F. System loop circuit surge protection.
1. Surge protectors for 24V alarm and notification loops in field replaceable modules
  2. 20KA surge current
  3. DITEK or Equivalent
- G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.
- H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- I. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals and digital alarm radio transmitters shall be powered by 24-V dc source.
1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- J. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
1. Batteries: Rechargeable sealed lead-acid.

## 2.5 MANUAL FIRE-ALARM BOXES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Honeywell
  2. Simplex
  3. Siemens
  4. Or Equivalent
- B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism, key rest; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
  2. Manual stations shall contain the intelligence for reporting address, identity, alarm and trouble to the fire alarm control panel.

## 2.6 SYSTEM SMOKE DETECTORS

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

1. Honeywell
2. Simplex
3. Siemens
4. Or Equivalent

B. General Requirements for System Smoke Detectors:

1. Comply with UL 268 7<sup>th</sup> edition; operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
6. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
  - a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
  - b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
  - c. Multiple levels of detection sensitivity for each sensor.
  - d. Sensitivity levels based on time of day.

C. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

## 2.7 HEAT DETECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. Honeywell
  2. Simplex
  3. Siemens
  4. Or Equivalent
- B. General Requirements for Heat Detectors: Comply with UL 521.
  1. Temperature sensors shall test for and communicate the sensitivity range of the device.
- C. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
  1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
  2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- D. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F (88 deg C).
  1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
  2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.8 NOTIFICATION APPLIANCES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Edwards Systems Technology
  2. Notifier
  3. Gamewell
  4. Honeywell
  5. Or Equivalent
- B. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
1. Rated Light Output:
    - a. 15/30/75/110 cd, selectable in the field.
  2. Mounting: Wall mounted unless otherwise indicated.
  3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
  4. Flashing shall be in a temporal pattern, synchronized with other units.
  5. Strobe Leads: Factory connected to screw terminals.
  6. Mounting Faceplate: Factory finished, white.

## 2.9 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
1. Electromagnets: Require no more than 3 W to develop 25-lbf (111-N) holding force.
  2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
  3. Rating: 120-V ac.
- B. Material and Finish: Match door hardware.

## 2.10 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
  - 1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

## 2.11 ADDRESSABLE INTERFACE DEVICE

- A. General:
  - 1. Include address-setting means on the module.
  - 2. Store an internal identifying code for control panel use to identify the module type.
  - 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall to circuit-breaker shunt trip for power shutdown.
  - 1. Allow the control panel to switch the relay contacts on command.
  - 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.
- D. Control Module:
  - 1. Operate notification devices.
  - 2. Operate solenoids for use in sprinkler service.
- E. Carbon Monoxide Detector:
  - 1. Carbon monoxide detector shall be a System Sensor model number CO1224T/CO1224TR (Or Equivalent), listed to Underwriters Laboratories UL 2075 for Gas and Vapor Detectors and Sensors. The detector shall be equipped with a sounder and a trouble relay. The detector's base shall be able to mount to a single-gang electrical box or direct (surface) mount to the wall or ceiling. Wiring connections shall be made by means of SEMS screws. The detector shall provide dual-color LED indication, which blinks to indicate normal standby, alarm, or end-of-life. When the sensor supervision is in a trouble condition, the detector shall send a trouble signal to the panel. When the detector gives a trouble or end-of-life signal, the detector shall be replaced. The detector shall provide a means to test CO gas entry into the CO sensing cell. The detector shall provide this with a test mode that accepts CO gas from a test agent and alarms immediately upon sensing CO entry.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
  - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
  - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
  - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.
  - 1. Comply with requirements for seismic-restraint devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- C. Manual Fire-Alarm Boxes:
  - 1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
  - 2. Mount manual fire-alarm box on a background of a contrasting color.
  - 3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.
- D. Smoke- or Heat-Detector Spacing:
  - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
  - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.

3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
  4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex in NFPA 72.
  5. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.
  6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- H. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- I. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- J. Device Location-Indicating Lights: Locate in public space near the device they monitor.

### 3.3 PATHWAYS

- A. Pathways above recessed ceilings and in non-accessible existing locations may be routed exposed.
1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT in unfinished areas and surface metal raceway in finished area.
- B. Pathways shall be installed in EMT or be type MC fire alarm control cable.
- C. All Pathways shall be dedicated to fire alarm system cabling. Routing fire alarm cabling utilizing other existing low voltage system pathways is not permissible.
- D. Any fire alarm system wiring that extends outside of a building shall have additional power surge protection to protect equipment from physical damage and false signals due to lightning, voltage and current induced transients. Protection devices shall be shown on the submittal drawings and shall be UL listed or in accordance with written manufacturer's requirements.

- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

### 3.4 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions.
  - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
  - 1. Smoke dampers in air ducts of designated HVAC duct systems.
  - 2. Magnetically held-open doors.
  - 3. Electronically locked doors and access gates.
  - 4. Supervisory connections at valve supervisory switches.
- C. All fire detection and alarm system devices, control units and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- D. Fire Alarm: Terminal cabinets shall be provided in locations shown and as otherwise required to support wiring terminations, troubleshooting and future tenant fit-up. Cabinets shall be painted red and contain terminal blocks to support the system wiring where the Control Panels are remote from the devices served. Cabinets shall include accommodation for all wiring including SLCs, notification circuits, and related addressable and fault isolation modules for future expansion and modification.
  - 1. Terminal boxes and cabinets shall have a volume 50 percent greater than required by the NFPA 70. Minimum sized wire shall be considered as 14 AWG for calculation purposes.
- E. Boxes shall be installed plumb and firmly in position.
- F. All splices shall be made using solder-less connectors. All connectors shall be installed in conformance with the manufacturer recommendations.
- G. Upon initial installation, all wiring outlets, junction, pull and outlet boxes shall have dust covers installed. Dust covers shall not be removed until wiring installation when permanent dust covers or devices are installed.
- H. Panel enclosures shall be installed to meet clearance requirements per NFPA 70 and local codes. Minimum requirements shall be 3 foot clearance in front of the enclosure



### 3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.
- C. "Fire alarm system" decal or silk-screened label shall be applied to all junction box covers.

### 3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

### 3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Engineer.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections. Utilize cloud-based commissioning and record keeping testing tools. Provide commissioning report as part of the close-out and AHJ testing documents.
- D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Visual Inspection: Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
  - 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
  - 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.

6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports, in PDF and Hard copy format.
- H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

### 3.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

### 3.9 ACCEPTANCE TESTING

- A. A written acceptance test procedure (ATP) for testing the fire alarm system components and installation shall be prepared in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
- B. A program matrix shall be prepared by the installing contractor referencing each alarm input to every output function affected as a result of an alarm condition on that input.
- C. The installing contractor prior to the ATP shall prepare a complete listing of all device labels for alphanumeric annunciator displays.

- D. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests shall be witnessed by the owner and test results recorded for use at the final acceptance test.
- E. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that all panel functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.
- F. Testing requirements for pre-action systems in accordance with NFPA13
- G. Testing requirements and room integrity testing for clean agent suppression systems refer to NFPA 2001.
- H. Final Acceptance Test: Notify the owner in writing when the system is ready for final acceptance testing. Submit request for test at least 30 calendar days prior to the test date. A final acceptance test will not be scheduled until the loop resistance test results, and the submittals required in Part 1 are provided to the college. Test the system in accordance with the procedures outlined in NFPA 72.
  - 1. Verify that the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
  - 2. Test each initiating and indicating device and circuit for proper operation and response. Disconnect the confirmation feature for smoke detectors during tests to minimize the amount of smoke or test gas needed to activate the detector.
  - 3. Test the system for all specified functions in accordance with the contract drawings and specifications and the manufacturer's operating and maintenance manual.
  - 4. Visually inspect all wiring
  - 5. Verify with all parties the required survivability of wiring, raceways, and junction boxes
  - 6. Verify that all software control and data files have been entered or programmed into the FACP.
  - 7. Verify that Shop Drawings reflecting as-built conditions are accurate. Upon final approval by all parties, provide two sets of AS-built documents. Per NFPA 72 7.7.2 Measure the current in Notification appliance circuits under full load to assure that there is the calculated spare capacity for every circuit.
  - 8. Measure voltage readings for circuits to assure that voltage drop does not exceed specified design requirements.
  - 9. Field Verify and measure the voltage drop at the most remote appliance on each notification appliance circuit.

### 3.10 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.

- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
  - 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

### 3.11 DOCUMENTATION

- A. System documentation shall be furnished to the owner and shall include but not be limited to the following:
  - 1. System record drawings and wiring details including one set of reproducible drawings, and a CD ROM with copies of the record drawings in PDF format.
  - 2. System operation, installation and maintenance manuals.
  - 3. System matrix showing interaction of all input signals with output commands.
  - 4. Documentation of system voltage, current and resistance readings taken during the installation, testing and ATP phases of the system installation.
  - 5. System program showing system functions, controls and labeling of equipment and devices.

### 3.12 DEMONSTRATION

- A. Instructor: Include in the project the services of an instructor, who shall have received specific training from the manufacturer for the training of other persons regarding the inspection, testing and maintenance of the system provided. The instructor shall train the employees designated by the college, in the care, adjustment, maintenance, and operation of the fire alarm system.
- B. Training sessions shall cover all aspects of system performance, including system architecture, signaling line circuit configurations, sensor and other initiating device types, locations, and addresses, fire alarm control panel function key operation, and other functions as designated by the owner.
- C. Required Instruction Time: Provide 16 hours of instruction after final acceptance of the system. The instruction shall be given during working hours on such dates and times as are selected by the college. The instruction may be divided into two or more periods at the discretion of the owner. One training session shall be videotaped by the contractor. Required owner format shall be delivered to the college.
- D. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the FACP. The card shall show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory and trouble. The instructions shall be approved by the owner.

SECTION 283112 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM – LIFE SAFETY  
MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section of the specification includes the furnishing, installation, and connection of a microprocessor controlled, addressable, intelligent fire alarm Life Safety Management System required to form a complete coordinated campus system ready for operation.
- B. Work described in this section shall be installed, wired, circuit tested, and calibrated by factory-certified technicians qualified for this work and in the regular employment of the company named on the UL Listing Card for the control equipment. The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in the submittal package verifying longevity of the installing company's relationship with the manufacturer. Supervision, calibration, and checkout of the system shall be performed by the employees of the local factory-owned Life Safety Management System contracting field office. Supplier shall have an in-place support facility within 100 miles of the site with technical staff, spare parts inventory, and all necessary test and diagnostic equipment.
- C. The system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.
- D. The system shall be an active/interrogative type system where each transponder and/or addressable device operates autonomously as a peer on the signaling line circuit. Devices shall process all conditions monitored and shall cause a signal to be transmitted to the main building fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional and the specific condition being processed by the device. Loss of this signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.
- E. Each designated building FACP shall transmit separate and different alarm, supervisory and trouble device level signals to the Life Safety Management System and designated personnel in other buildings at the site via a multiplex communication network.
- F. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.
- G. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
- H. The installers shall be employees of the manufacturer or manufacturer's parent company. The installers shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

- I. All components of the fire alarm system ( LSMS and FACPs ) must be provided from a single source manufacturer. These components include the fire alarm control panel, all associated system hardware, system software, intelligent detection and control devices, audio/visual devices, manual pull stations, water flow switches, etc.

1.2 SCOPE:

- A. A new intelligent reporting, microprocessor controlled Life Safety Management system shall be installed in accordance with the specifications and drawings.
- B. The system shall be designed such that each signaling line circuit (SLC) is limited to only 80% of its total capacity at initial installation.
- C. Basic Performance:
  1. Performance and capabilities are based on the Honeywell Building Solutions EBI Life Safety Management System (LSMS).
  2. Each system operator workstation shall provide a single-seat interface to include monitoring, display and control of building level fire alarm devices and real time asset location system.
  3. The Life Safety Management System (LSMS) system shall use a UL Listed client server architecture based around a modular PC network, utilizing industry standard operating systems, network devices, and protocols.
  4. The system shall allow the distribution of system functions such as monitoring and control and graphical user interface across the network to allow maximum flexibility and performance. The architecture shall support various Wide Area Networks (WAN) using standard hardware and software to link nodes into a single integrated system. The network protocol shall be industry standard TCP/IP. The system shall support remote configuration and operation via VPN.
  5. Redundant server: This facility shall enable the system server to operate in high availability architecture with no single point of failure. The system shall run a pair of similarly configured computers in a hot backup configuration where at any point in time, one is the acting primary and the other the acting hot backup. An on-line database duplication mechanism shall be supported. Simply scanning I/O on two separate systems and processing independently is not acceptable. Perform database duplication on a per-transaction basis to ensure that the duplicated backup database is consistent at all times with the primary database and to avoid unnecessary loading of field devices caused by duplicate polling. It shall be possible to remove one of the redundant systems for maintenance without interrupting operation, and upon its reinstatement, re-synchronize the databases, again without interruption to system operation. Provide method for manually initiating fail over to assist with maintenance operations. Failure of either system shall be announced audibly and visually via the alarming subsystem. To accommodate recoverable faults, the failed system shall reboot automatically after non-fatal errors and assume the role of acting as hot backup automatically.
  6. Redundant communications: The system shall be capable of supporting fully duplicated communications links to operator workstations and field devices that support this type of connection. The system and its associated operator workstations shall be capable of connecting to two fully independent Ethernets run in parallel. No repeater or bridge

connection between the Ethernets is acceptable as a means of achieving this function. Operator workstations shall be capable of switching automatically between the two server computers in the event of fail over, and switching between two Ethernets automatically in the event of an Ethernet failure. Capabilities shall exist to interface to devices via direct serial connection (or modem), serial connection via Ethernet connected terminal servers. Using back-to-back terminal servers will be deemed unacceptable. The system shall be able to directly communicate with the terminal servers via Ethernet.

7. Distributed system server: Provide a method for monitoring and control of points on remote LSMS servers. Specifically, real-time and history values in any LSMS server shall be available to any other server for monitoring and control. Features supported shall include:
  - a. Access: Access to data shall be global, such that users at operator workstations on one server can access data, history, and point detail displays for points on any other server. It shall not be necessary to configure more than one point for each data value or signal, regardless of the number of servers accessing the data.
  - b. Security and filtering: It shall be possible to nominate sets of points to be accessed on a server-by-server and user-by-user basis. The mechanism shall be the same as the mechanism to control individual operator and workstation access to data for single server systems.
  - c. Alarms and messages: Operators and workstations at any server shall see alarms from any other server. It shall not be necessary to configure alarms more than once, regardless of the number of servers accessing the data.
  - d. Trending: Configure real time and historical trends that combine data from any connected server on a single trend. It shall not be necessary to configure more than one point for each data value or signal, regardless of the number of servers accessing the data.
  - e. Graphics, reports, and applications: Graphics, reports, and applications at a server shall have the same distributed access to data on other servers as described above for operators and workstations. It shall not be necessary to configure more than one point for each data value or signal, regardless of the number of servers accessing the data.
  - f. Cardholders ( Per-User Access Permissions): Distribute Cardholders in the LSMS to all servers so that cardholders need only be enrolled into one server and will automatically then have access to all other servers if desired. Access requirements for all servers will be set up at the time of enrolment in one server.
  - g. Engineering effort to configure points in a distributed server system shall be the same as for a single server system.
  - h. Connections between servers shall be made through existing Fiber plant and all UL listed dedicated network equipment required shall be included. Connections shall be redundant. Both redundant and non-redundant servers shall be supported, and the same engineering effort (i.e., none) shall be required to connect both kinds of servers.
8. Server computer and operator workstation hardware can interface to an IEEE 802.3 standard local area network (LAN). The LAN shall use standard network cables. Acceptable cable types are thin Ethernet, thick Ethernet, fiber, and twisted pair.

- a. Field Verify rack mounting requirements and hardware needed for each server.
  - b. Coordinate with TCNJ for redundant power for each server.
9. LSMS management and control functions provided shall perform the following:
- a. Acknowledging, silencing, and resetting fire alarm and security event functions.
  - b. Manually activating, deactivating, enabling, and disabling individual fire alarm and security points
  - c. Manually activating and restoring alternate sensitivity settings for smoke detectors.
  - d. Manually activating and restoring alternate messaging on the Life Safety panel.
  - e. Manually initiating and terminating fire drill.
  - f. Manually initiating and terminating evacuation operation.
  - g. Generating status, maintenance, and sensitivity reports for all fire alarm components.
  - h. Activating an audio WAV file over the workstation speakers, alerting the operator to a fire alarm or security event.
  - i. Collecting and historical data.
  - j. Managing alarms.
  - k. Trending.
  - l. Generating reports.
  - m. Network integration.
  - n. Managing data exchange and integration with a diverse range of other computing and facilities systems using industry-standard techniques.
  - o. Duplicate Remote Operator System Display monitoring and control functionality.
10. At a minimum, the following data shall be accessible:
- a. Panel alarms
  - b. Panel supervisory alarms
  - c. Panel troubles
  - d. Panel communications status
  - e. Device status

D. APPROVED life safety SYSTEM MANUFACTURING CONTRACTORS

1. The following are the approved control system contractors and manufacturers:
  - a. Honeywell Building Solutions
  - b. Simplex
  - c. Siemens Intelligent Infrastructure
  - d. Or Equivalent

1.3 SUBMITTALS

A. General:

1. Two copies of all submittals shall be submitted to the Engineer for review.



2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
  3. All substitute equipment proposed as equal to the equipment specified herein, shall meet or exceed the following standards. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. If any substitute equipment is provided, then all equipment shall be from the substitute vendor as required by section 1.1.H above.
  4. Contractor must submit proof that the system has been listed to UL 864, 9<sup>th</sup> edition. Systems listed to UL864, 8<sup>th</sup> edition will not be accepted.
- B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
  2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
  3. Show annunciator layout, configurations, and terminations.
  4. Provide individual shop drawings for each workstation, server, network switch, workstation-server network architecture, etc.
- C. Manuals:
1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
  2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
  3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.
  4. Approvals will be based on complete submissions of manuals together with shop drawings.
- D. Software Modifications
1. Provide the services of a factory trained and authorized technician who is a regular employee of the system manufacturer or parent company to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
  2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.
- E. Certifications:

1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is employee of the major equipment manufacturer. Include names and addresses in the certification.

1.4 WARRANTY

- A. All material and equipment furnished under this contract shall be free from defects and shall remain so for the periods of time per the bid proposal worksheet.

1.5 POST CONTRACT MAINTENANCE:

- A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

1.6 POST CONTRACT EXPANSIONS:

- A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

1.7 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification. The publications are referenced in text by the basic designation only. The latest editions of these documents that have been adopted by the local jurisdiction shall apply.

1. National Fire Protection Association (NFPA) - USA:

- a. No. 70 National Electric Code (NEC)
- b. No. 72 National Fire Alarm Code
- c. No. 90A Air Conditioning Systems
- d. No. 92A Smoke Control Systems
- e. No. 92B Smoke Management Systems in Malls, Atria, Large Areas
- f. No. 101 Life Safety Code

2. Underwriters Laboratories Inc. (UL) - USA:

- a. No. 50 Cabinets and Boxes
- b. No. 268 Smoke Detectors for Fire Protective Signaling Systems
- c. No. 864 Control Units for Fire Protective Signaling Systems
- d. No. 268A Smoke Detectors for Duct Applications.
- e. No. 521 Heat Detectors for Fire Protective
- f. No. 228 Door Closers-Holders for Fire Protective Signaling Systems.
- g. No. 464 Audible Signaling Appliances.
- h. No. 38 Manually Actuated Signaling Boxes.

- i. No. 346 Waterflow Indicators for Fire Protective Signaling Systems.
  - j. No. 1481 Power supplies for Fire Protective Signaling Systems.
  - k. No. 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems.
  - l. UL 1283 – Electromagnetic Interference Filters
  - m. UL 1449 - Transient Voltage Surge Suppressors
  - n. No. 1971 Visual Notification Appliances.
3. The Fire Alarm Control Panel shall be listed to UL864, 9th edition. Systems listed to UL 864, 8th edition will not be accepted.
  4. Local and State Building Codes.
  5. New Jersey amended IBC 2018 edition and Ewing Township local building codes as adopted and/or amended by The Authority Having Jurisdiction, ADA, and/or State and local equivalency standards as adopted by The Authority Having Jurisdiction.

#### 1.8 APPROVALS:

- A. The system shall have proper listing and/or approval from the following internationally recognized agencies:
  1. UL Underwriters Laboratories Inc
  2. FM Factory Mutual
- B. The Life Safety Management System and all components shall meet the modular listing requirements of Underwriters Laboratories, Inc. Each subassembly, including all printed circuits, shall include the appropriate UL modular label. This includes all printed circuit board assemblies, power supplies, and enclosure parts. Systems that do not include modular labels may require return to the factory for system upgrades, and are not acceptable.

#### PART 2 - PRODUCTS

##### 2.1 EQUIPMENT AND MATERIAL, GENERAL:

- A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.
- B. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for all specific system installation/termination/wiring data.
- C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

## 2.2 COMMUNICATIONS

- A. Server computer and operator workstation hardware shall interface to an IEEE 802.3 local area network (LAN). The LAN shall use standard network cables. Acceptable cable types are
  - 1. Fiber – For LSMS Network Loop between FACPs.
  - 2. Category 6 UTP – For server computer and operator workstation connections to LSMS network infrastructure.
- B. Contractor shall provide a dedicated Ethernet LAN communication media, connectors, repeaters, hubs, and routers necessary for the internetwork operation required to provide the specified functionality.
- C. Contractor shall provide serial modem communication hardware, cabling, and RFI and EMI filters to allow for remote operator interface. Remote operator interface shall permit communication with all panels on this network as described in paragraph D below.
- D. Communication services over the internetwork shall result in operator interface and value passing that is transparent to the internetwork architecture as follows:
  - 1. Connection of an operator interface device to any one panel on the internetwork will allow the operator to interface with all other panels as if that interface were directly connected to the other panels. Data, status information, reports, system software, and custom programs for all panels shall be available for viewing and editing from any one panel on the internetwork.
  - 2. All database values (e.g., objects, software variables, custom program variables) of any one panel shall be readable by any other panel on the internetwork. A panel shall automatically perform this value passing when a reference to an object name not located in that panel is entered into the panel's database. An operator or installer shall not be required to set up any communication services to perform internetwork value passing.
- E. The internetwork shall have the following minimum capacity for future expansion:
  - 1. Support greater than 90 separate communications links to networks of control devices.
  - 2. Support a minimum of 80 simultaneous operator workstation connections using TCP/IP local area network (LAN) subject to hardware capacity on the server.
  - 3. System size shall be expandable to at least two times the number of hardware and software input and output points required for this project, or 12,000 points, whichever is greater.
  - 4. Shall include Ethernet switches in each of Green Hall, Cromwell Hall, Facilities and Administration Services if required. Switches shall be fully inter-connected via fiber with loop prevention mechanism and be equipped with redundant power supplies or UPS back up.
  - 5. Contractor to coordinate with TCNJ IT Department for TCP/IP Addressing Scheme.

## 2.3 SERVER COMPUTER

- A. The system server computer shall comprise all of the following minimum hardware:

1. Intel Fourth Gen Intel i7 / i5 / i3 Processing
2. 32GB of RAM
3. Graphics card capable of 1280x1024 pixel resolution and 65K colors
4. 12 function-key keyboard
5. Mouse pointing device
6. Onboard Intel® RAPID Storage, RAID 0, 1, 5, 10
7. Hot-Swap Options Available (Up to 2 Drives)
8. Ethernet adaptor
9. UL Listed server computer platform shall be used when UL compliant system is required.
10. UPS (uninterruptible power supply) for each LSMS PC operator workstation; size for 50 percent spare capacity with sufficient capacity to allow emergency power for a minimum of 10 minutes backup

#### 2.4 OPERATOR STATION INTERFACE

- A. The fire alarm control panel(s) shall be connected to a supervising station provided in accordance with NFPA 72, chapter 8. The supervising station shall be UL 864 UOJZ listed for the primary operation, including acknowledge, reset, command, and control of the fire alarm system.
  1. To include all needed Fire Network Adapters, interfaces, control modules, etc.

#### 2.5 WORK STATION

- A. Operator interface: Furnish dedicated PC-based workstations as shown on the system drawings. Each of these workstations shall be able to access all information in the system. The system shall support up to 80 simultaneous operator workstation connections using a TCP/IP local area network (LAN) subject to hardware capacity on the server computer. The network connection shall allow a limitless number of casual users access to the 80 connections on a first-come, first-served basis. Casual user shall only be used in an ancillary capacity for Life Safety applications. This project shall be licensed for 12 casual users.
  1. Provide the latest industrial grade PC model of the nominal speed, RAM and memory for a commercial office grade PC from a named brand manufacturer. Servers are connected to one another in order for an end-user to seamlessly navigate the objects in the system independently. This shall include, and not be limited to: Activating outputs, enabling or disabling points, adding or removing intelligent points, viewing intelligent detector sensitivity levels and modifying point information (custom messages, detector type, verification, day/night selection etc). This means the client computer is not reliant of any specific server to which it is connected. Microsoft IIS server for Browser Clients and Desktop Application downloads can be installed on the server or on a separate installation. The server hosts all the data for the system, while the clients are only for the visualization and the user interaction. The clients provide a high-resolution interface to all the relevant server data needed for monitoring and commanding the system. Control of the fire-safety system can be transferred from one client to another client if desired. Locate the Operator Workstations in a clean, secure, dry and temperature-controlled environment. Minimum requirements and accessories shall be:
    - a. Certifications: UL 864 9th Edition / ULC-S527-11 / UL 2752 Recognized

- b. CPU: 4th Gen Intel® Core™ i7/i5/i3 Mobile Processor; Up to Quad-Core Technology. 3GHz processor speed minimum 6M cache
  - c. Operating System: Microsoft® Windows 10 Pro
  - d. Network Controller: (2) Intel® GigaLAN
  - e. Network Switches: capability for UL listed single, multimode and/ or Ethernet Ports
  - f. 20GB Ram, Dual Channel, DDR3 SDRam at 1333MHz minimum
  - g. Storage:
  - h. 2.5” Solid State Drive, Up to 512 GB (MLC)
  - i. 3.5” Hard Disk Drive; 2 TB
  - j. 16x R/W CD and DVD
  - k. Video Card with 512 MB RAM
  - l. Graphics card to support minimum of 2 displays (via HDMI or DisplayPort)
  - m. NIC Card
  - n. 101 key enhanced keyboard, Mouse, power strip
  - o. A UL1481 listed UPS is required to be used with a UL864 listed management station.
  - p. Uninterruptible Power Supply/ surge protector with minimum ratings of 1500VA/ 900-watts; 6-Outlet and 2-USB ports and internal/replaceable batteries
2. Provide a 22-inch wide screen, active matrix flat desktop panel type monitor that supports a minimum display resolution of no less than 1920 × 1080 pixels, Energy Star compliant 32-bit color. The display shall have a minimum of 21-inch visible area in diagonal measurement. Separate controls shall be provided for color, contrasts and brightness. The screen shall be non-reflective.
- a. Black Frame and Stand
  - b. Built-In Speakers; (2) Multimedia, Built-In, 2 Watt, and 3.5mm Audio Plug
  - c. UL864, ULC-S527-11, UL 2572 Recognized
3. Provide open communications fire alarm software platform with an open architecture for fire-safety command and control applications offering configurations from small, single-seat to large, multi-user installations with the capabilities to support a multi-vendor environment. To accomplish this effectively, system shall be capable of utilizing standard protocols as follows as well as be able to integrate third-party systems via existing vendor protocols. The server hosts all data for the management station. Full control shall be capable of being transferred from the server to a client.
- a. The User Interface (UI) shall displays all critical data in a single view. Additional detail information shall be provided with user prompts. End users can navigate the system through Systems Manager or via graphical interface. Panes can be tailored to the user-specified requirements for a specific buildings or areas. A non-minimizable Summary Bar shall serve as an important source of data for event management and highlights current system status with clear indication of current-event priorities.
  - b. Fire alarm status event lamps events highlighted with different colors when events occur for:
    - 1) Alarm
    - 2) Supervisory
    - 3) Trouble

- c. User Interface (UI) can be configured to support basic to advanced needs, with password for different users. User profiles can be created, based on various end-user needs. To ensure proper level of event management support by the LSMS for any system event situation, pre-defined profiles shall be established for each end-user or workstation that provide the correct level of event management for that user or workstation.
- d. The LSMS shall include the ability to display system information in a graphical (floor plan) format. Each view shall include icons created for intelligent devices. These icons shall blink and change to the appropriate programmed icon when an event occurs. When the device has been acknowledged, the icon shall become steady. Once the point has returned to normal, the normal icon is displayed. In addition to the graphical representation of the device, the user shall be able to link pictures, documents, and sound files to the device. Routine maintenance shall also be possible using the associated intelligent point. Graphics are built using smart objects that know how they are used and how to represent themselves graphically. The use of smart objects shall allow the user to create graphics by simply dragging and dropping objects onto a page, without manually binding object to graphical symbols. The graphics package must also supply an AutoCAD importing tool to allow the user to select and manipulate layers of the original AutoCAD drawings during and after the import process.
- e. Provide capability for pre-defined Macro lists of events that enable a user to send out a group of events to specified devices with a single action. Macros can be started manually or automatically based on schedules defined for time-based functions or automatic reactions.
- f. Automatic or manual Remote Notification (ReNo) of events via email, text message, pager to first-level responders with Remote Notification. Escalated notification when necessary can also be sent to second-tier responders.
- g. Provide a Mobile App designed for the Android and iOS operating systems enabling the user to remotely view events and object status based on user privileges. Users shall receive event notifications when new events are available. The Mobile App can optionally provide commanding of events and objects based on user privileges. The use of event commanding must be reviewed with and permitted by the local authority having jurisdiction (AHJ) or equivalent.
- h. The User Interface shall be accessible from remote, non-UL / ULC computers solely for monitoring, via the available Web Client. This Remote Access feature enables up to 20 key stakeholders to have the same view of the User Interface as those operating the system from a remote computer – provided the LSMS is installed on an intranet site – therefore enabling faster sharing of critical data over a wide area.
- i. Agency-listed for remote access (monitoring only) via a Virtual Private Network (VPN) connection.
- j. The following graphic file types shall be supported:
  - 1) DWG
  - 2) DXF
  - 3) PDF
  - 4) PNG

- 5) BMP
  - 6) GIF
  - 7) JPG
  - 8) JPEG
  - 9) TIF
  - 10) TIFF
  - 11) RLE
  - 12) ICO
- k. UL and ULC recognized as an ancillary annunciator when used with a non-UL864 / ULC-S537-11 Listed computer that is connected to listed FACP.
  - l. The LSMS shall include comprehensive reporting tools which include standard reporting templates. The Reports feature shall permit the development of fully configurable reports with custom logos, headers, footers and layouts that include tabular and graphical system data. Reports can be scheduled and saved in .CSV or .PDF file extensions for future use.
  - m. Provide a Document Viewer to displays system related data sheets, operating manuals or other information contained in document file (e.g. a product data sheet).
  - n. Provide a Log Viewer for history of system events and end-user programming for further analysis. It shall provide a simplified view of the most recent user and system events and activities, relative to an individually selected object along with more detailed historical tracking of events.
  - o. System shall be capable of high-speed Ethernet communication using BACnet/IP and TCP/IP protocol.
  - p. The system shall be capable of supporting both standard and vendor specific protocols to integrate a wide variety of third-party devices and legacy systems including, but not limited to:
    - 1) Fire Alarm System
    - 2) Security and Access Control
    - 3) In-Building Mass Notification System
    - 4) Building Automation System
4. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed specifically for this project.
  5. The system shall be scalable in nature and shall permit expansion of both capacity and functionality.

B. System Software:

1. Operating system. Furnish a concurrent multitasking operating system. Operating system shall also support common software applications, such as Microsoft Excel, Microsoft Word, and Access. Acceptable operating systems are Microsoft® Windows Server 2008/2012, Microsoft® Windows 10 Pro. The networking software shall use industry standard TCP/IP LAN protocol. System peripherals shall be capable of being connected to the server computer via the LAN. The operator interface shall also be compatible with Windows Terminal Services, allowing remote PDA devices to be used as mobile operator interfaces.



2. System graphics: Operator interface shall be graphically oriented and allow for efficient communication of operational data and abnormal conditions. Graphics shall support at least 65,000 colors at a minimum 1024 x 768 pixel resolution. It shall provide a consistent framework for viewing of information. Critical areas (such as alarm icons) shall be visible at all times. A predefined area on the screen shall provide operator messaging, and this area shall be visible at all times. A set of standard displays for configuration and navigation around the FMS system shall be provided with every system and not require any engineering. FMS shall also have an unlimited number of custom (facility-specific) displays created to meet the needs of the specific facility.
3. Operator interface shall employ standard Windowing conventions to reduce required operator training. Standard tool bar icons and drop-down menus shall be available on standard and custom displays to allow access to common functions. The tool bar and pull-down menus shall be fully configurable. Similarly, such functions shall also be available via a standard set of function-key-based pushbuttons without requiring configuration. The interface shall support a mouse and touch screen for pointing and command input.
4. The operator interface shall support the ability to “full screen lock” the window so users cannot access other applications. If “full screen lock” is not enabled, support for copy-and-paste facilities shall be provided between the operator window and other Microsoft applications.

C. Web browser interface

1. Operator interface shall be available through a web browser. Using a browser such as Microsoft’s Internet Explorer, an operator shall be able to perform all functions on the same standard and custom graphics as used in the standard operator interface. Custom graphics, alarm graphics, and standard graphics shall be available without modification or reengineering through a browser user interface and be fully functional.
2. Browser interface shall provide login and security authentication in the same way as the standard operator interface. It shall be possible to operate the facility through the browser user interface in the same way as the standard user interface and to perform all functions (operator functions); for example, acknowledge alarms, view graphics, control points, execute reports, and modify configuration settings.

D. Operator interface characteristics: The system shall provide a Windows operator interface using dedicated icons and pull-down menus with the minimum capabilities listed below. No custom programming or scripting shall be necessary to produce the following:

1. Window re-size, zoom in, zoom out
2. Associated alarm display
3. Alarm summary
4. Alarm acknowledgment
5. Display sequence forward and backward
6. Previous display recall (minimum of eight displays)
7. Graphic call-up
8. Trend call-up
9. Point detail call-up
10. Card holder detail

11. Pop-up face plates
  12. Alarm banner showing highest priority and most recent (or oldest) unacknowledged alarm
  13. System date and time zone
  14. Current security level
  15. Workstation connection number
  16. Alarm annunciation
  17. Communications fail annunciation
  18. Operator message zone
- E. Operator functions: The following functions shall be performed through the operator interface:
1. Display and control field equipment.
  2. Acknowledge alarms on a priority basis.
  3. Initiate report printing.
  4. Archive and retrieve event logs.
  5. View intranet or information from the Internet in a secure environment.
  6. View ActiveX documents.
  7. Use ActiveX controls.
  8. Change own password.
  9. Monitor data communications channels.
  10. Configure system parameters.
  11. Assign control confirmation messages to individual points.
- F. The following standard system displays shall be included as part of the system. In the case of the trend and group displays, configuration of these displays shall only require entry of a point name to completely configure the display. The alarm summary, event summary, point detail, communications status, and system status shall not require any configuration. Systems where standard graphical displays, showing all parameters for each system point, do not exist shall not be acceptable.
1. Alarm summary display
  2. Event summary display
  3. Point detail template displays (for each point in the database)
  4. Trend set template displays
  5. Group control and group trend template displays
  6. Communications status displays
  7. System status displays
  8. Operator scratch-pad display
  9. Face plates for all common point types
  10. Configuration displays
- G. Provide system status displays on the main operator workstation that display the following information:
1. Points in alarm condition pending acknowledge command
  2. Points that remain in an alarm state, but which have been acknowledged
  3. Communication failures
  4. Printer status
  5. Operator workstations status
  6. Communication links status

7. Controller status
- H. Provide system with the following full screen administrative displays:
1. Master system menu
  2. Report summary
  3. Alarm summary
  4. Event summary
  5. Display summary
  6. System parameters configuration
  7. Operator workstation configuration
  8. Area assignment
  9. Time schedule assignment
  10. Holiday assignment
  11. History assignment
  12. Push-button assignment
  13. Operator definition
  14. Operator message board
  15. Events archive and retrieval
  16. Time period summary and configuration
  17. Point detail for every configured point
- I. The LSMS system shall provide a means by which a number of alarm inputs, outputs, and other related points can be grouped together for more convenient monitoring and control without the need for custom graphics.
- J. Configuring time schedules shall be done through a graphical user interface where the operator selects the appropriate time span from a calendar. It shall be possible to specify time schedules for the control of all smoke and heat detector sensitivity settings. A large number of individual detectors shall be controlled by a single time schedule. A single time schedule shall define the control to any combination of day and time, e.g., Monday-Friday 7:00 to 18:00, Thursday 7:00 to 22:00, and Saturday-Sunday 9:00 to 14:00. The LSMS time schedule shall provide the ability to override the normal schedule for holidays or special occasions. Where the control device supports an internal time schedule program, the LSMS shall upload, display, modify, and download the control device time schedules. Support for the control device time schedules shall be in addition to the LSMS time schedules. Systems where times and days are manually entered are not acceptable.
- K. The LSMS operator interface shall have access to online help and full system documentation. Online help shall be fully searchable and cross-referenced to all relevant sections of the documentation. It shall be possible to browse the online help and set “favorites” that link to commonly used sections of the help information. Provide manuals online.
- L. Provide LSMS system shall with a system diagnostics utility. Diagnostic information shall be viewable through an intuitive user interface exported as a standalone collection of material for later analysis. This information shall include communications traces to selected panels, system log files, details on system software installation, and application status information.
- M. The LSMS operator interface shall be fully translatable into the local language. This includes languages that do not support the European character set, e.g., Chinese. The process of translating a system shall be done by editing message files and by editing displays.

## 2.6 OPERATOR STATION COMMUNICATION

- A. Operator interface shall use an Ethernet LAN connection between the server and the operator workstations. The operator interface shall also provide Microsoft Remote Access Service (RAS) support. Using other packages such as Microsoft Terminal to make the modem connection shall not be acceptable.

Internetwork stiches shall be fully interconnected via fiber and be equipment with loop prevention and redundant power supplies and UPS back up.

- B. The operator interface LAN connection shall support both permanent and casual access to the LSMS server, either through the standard operator interface or through a browser. A large number of casual users shall be permitted without any additional licensing burden. Licensing shall be based on the number of simultaneous operator connections on a “First come, first served” basis. Those users with casual access shall automatically disconnect from the LSMS server after an idle timeout period.
- C. To minimize bandwidth on both serial and LAN links, the operator interface shall only require updated dynamic information from the LSMS server. All static information (such as display backgrounds) can be stored locally.
- D. The system shall support acquisition of data by using periodic scanning, report by exception (RBE), and data on demand. To minimize communications traffic, the system shall automatically block data requests using contiguous addresses and scan intervals to generate scan packets, optimizing throughput for a given scanning load. Provide utilities to examine scan packet allocation for each scan interval, and compile aggregate statistics on communication link usage. Where supported by the controlling device, RBE protocols shall be used to reduce the scanning load of the system while improving system response. If necessary, periodic scanning may be used in conjunction with RBE to ensure data integrity.

## 2.7 OPERATOR SECURITY AND SIGN-ON

- A. Operator shall be assigned a user profile that defines the following:
  - 1. Security and control level
  - 2. Operator identifier
  - 3. Unique password
  - 4. Area assignment and area profile
  - 5. Start graphic for that operator
  - 6. Timeout value for that operator
- B. Any actions initiated by the operator shall be logged in the event database by operator identifier. In addition, any control actions to a given point shall only be allowed if the control level configured in the operator's profile exceeds the level assigned to the controlled point.
- C. Utilities shall be provided to allow administration of the operator passwords.
- D. The system shall support at least six levels of operator security. The functions allowed from each security level shall be as follows (coordinate with college for access levels):
  - 1. Level 1: Signed off mode—View start-up display only.

2. Level 2: View only—View displays; typically used for an inexperienced operator.
  3. Level 3: Permit all Level 1 and 2 functions and, in addition, permit the operator to control points such as start and stop, disable and enable, and to acknowledge alarms as they occur.
  4. Level 4: Permit all Level 1 through Level 3 functions, in addition to accessing master time schedules, system peripherals allocation, change point engineering parameters, build reports, and most standard system configuration displays. Typically reserved for the building supervisor.
  5. Level 5: Permit all Level 1 through Level 4 functions, in addition to accessing engineering functions, such as building and linking displays, and allocating keyboard push button assignments. Reserved for the building engineer.
  6. Level 6: This is the highest level of station security, typically allowing the user unlimited access to all station functions. Reserved for the building manager.
- E. The operator shall be permitted to sign on to the system if the correct operator identity and password have been entered. This password shall be encrypted. It shall be possible to have the system linked to Windows so that the operator uses their Windows account name and password to sign on to the LSMS system. This ensures that operators only need to remember one set of credentials.
- F. After a series of three unsuccessful attempts to sign on, the operator workstation interface shall be locked for a configurable period of time. The lockout period shall be set via system configuration displays. During operator workstation lockout, the other Windows functions of the computer running the operator workstation software shall not be affected.
- G. It shall be possible to assign operators either single or multi-user passwords. Single user passwords enable the operator to sign on to only a single operator workstation, thus preventing simultaneous sign-on for the same operator. Operators with the highest sign-on security level may require simultaneous access to more than one operator workstation and would typically use the multi-user password.
- H. The operator may sign off at any time by issuing a sign-off command. A keyboard time-out feature shall be provided so that the operator shall be automatically signed off after an adjustable time period of keyboard inactivity. It shall be possible to configure automatic sign-off to call up a predetermined "logged-out" graphic display to hide potentially restricted information embedded in the last display viewed prior to automatic time-out.
- I. Each operator shall be assigned one or more specific areas of the building with the appropriate monitoring and control responsibility (no view, view only, alarm acknowledge only, or full control). An area shall be defined in this context as a logical entity comprised of a set of points in the system. This represents a physical space in the building. Areas shall be used to partition the database so as to assign operators control over certain areas and prevent unauthorized access to other areas.
- J. Operators shall create area profiles, which combine areas and time periods, and which can be assigned to operators with the same area access requirements. By using area profiles in this way, area access can be specified to apply during certain time periods, allowing different areas of access at different times of the day or week.

- K. It shall be possible for an operator to indicate signing on under duress. The system shall recognize this and issue a command to alert appropriate personnel for assistance.
- L. It shall be possible to assign to each operator a set of allowed commands for each assigned area, where an area is a group of points. These commands shall be mapped against the output state of any given digital point in the respective area to determine whether a control command is allowed for the particular operator. With this feature, for example, it shall be possible to configure an operator to set a digital point to on, but to disallow the same operator from setting the same digital point to off.

## 2.8 CUSTOM DISPLAY CREATION

- A. Provide a graphic display including site-specific displays of the campus, each individual building, and each building floor, with individual addressable device level information for the Life Safety Management System (LSMS). It shall allow one-step online building of display static and dynamic objects. It shall be a WYSIWYG editor (what you see is what you get); allowing displays drawn using the editor to appear exactly the same when viewed from an operator workstation.
  - 1. Contractor shall coordinate with the owner for graphic user interface but at a minimum will include a home screen starting with a campus level map with alert bar and allow for users to drill down through building and floor, to the device level inside each building. This shall also include all functionality currently implemented on the existing system, such as graphic plans for each building, device status, alarm status, alarm control, trend logs, etc
  - 2. As a minimum the graphics will include a home screen starting with a campus level map with alert bar and allow for users to drill down through building and floor, to the individual addressable device level information inside each building. This shall also include all functionality currently implemented on the existing system, such as graphic plans for each building, device status, alarm status, alarm control, trend logs, etc.
  - 3. Alarms shall be viewed in a consolidated alarm summary that shows all current or pending alarms on the system. This summary shall be sorted by time and date, database partition, or source of the alarm. The fields shown on the alarm summary shall be configurable and it shall be easy to move or change the alarm fields displayed. It shall be possible to apply filters to the list of alarms to limit the view of alarms to those that match the filter.
  - 4. A dedicated alarm banner shall appear on all displays showing either the most recent or oldest (configurable), highest priority, unacknowledged alarm condition in the system.
  - 5. Banner shall always display the oldest or newest un-acknowledged alarm Audible signal notification at the workstation, configurable for notification priority, notification type, unacknowledged state, etc.
  - 6. Operator shall be able to click on a building on the view screen showing campus map to drill down for additional alarm detail. Drill-down shows current alarm state, last updated date/time, and last 10 alarm conditions reported (listing filterable and configurable). Drill-down into a campus building shall expose per-floor plans with device locations

positioned at their corresponding location on plan. Each floor plan shall show per-building and per-floor device state status summary. Individual device status shall be indicated on each plan. Alarm messages reported for the building shall link to the reporting device or devices, such that selecting an alarm notice (regardless of age, acknowledgement, or status) shall immediately bring the involved devices into view on the plans.

7. College will furnish AutoCAD floorplans for all buildings for use in developing LSMS displays per-building and per-floor
- B. Create displays in the HTML (Hypertext Markup Language) format. This is essential so that the displays can be viewed through a web browser as well as the normal LSMS operator interface. Save displays in the standard HTML format. Graphic elements shall be HTML elements. It is not acceptable to have an HTML format which merely links to a proprietary object or bit map of the entire display. View and edit the resulting HTML file using a text editor. Systems that do not support HTML displays shall not be acceptable.
- C. Use the graphic display-building editor to create static objects, including static text, rectangles, arcs, and circles. Animate static objects to provide the dynamic characteristics of the real-world object the point represents.
- D. Link dynamic objects to the LSMS database. This shall permit information to be displayed from the database or allow an operator to interact with the objects in order to make changes in the database and perform control actions. Dynamic objects shall include dynamic text, push buttons, indicators, charts, check boxes, combo boxes, pop-up boxes, ActiveX controls, and scroll bars.
- E. Include static and dynamic display objects on one display. The editor shall allow display objects to be manipulated by pointing, clicking, and dragging. The editor shall allow display objects to be drawn, re-sized, copied, grouped, rotated, aligned, and layered over each other. It shall be possible to copy and paste objects within and between displays.
- F. The graphic display-building editor shall support the following features:
  1. One-step display building (both background and dynamic information)
  2. Point and click operation
  3. Paste to and from the clipboard
  4. Absolute positioning object placement
  5. Ruler and grid
  6. Configurable tool, color, and line palettes
  7. Dialog boxes for definition of object properties
  8. Shape and page building
  9. On-line help
  10. Importable graphics from third-party packages, including WMF, BMP, TGA, GIF, and JPEG formats
  11. Standard library of LSMS industry objects
  12. Live video element
  13. Building of face plates
  14. ActiveX controls
  15. ActiveX documents
  16. Display scripts written in either JavaScript or VBScript
  17. Multilevel undo and redo

18. Object manipulation, including combine, union, and intersection
  19. Polyline node editing
  20. Transparent images
- G. Animate display elements using standard HTML scripts such as JavaScript or VBScript. A script editor supporting one of the standard script languages shall be provided. By using script programs, individual elements on the display may be manipulated. A proprietary scripting language or additional scripting and drawing package shall not be acceptable. It shall be possible to perform a variety of animations, which include but are not limited to moving, resizing, and re-coloring objects, and providing pop-up messages and dialog boxes.
- H. Scripts may be activated on displays using the following events:
1. On mouse click
  2. On mouse enter
  3. On mouse move
  4. On page call-up
  5. On a timer
  6. On value or state change of a point on the display
  7. Both the graphic display-building editor and the operator interface shall have built-in support for the creation and display of live video objects without the need for programming. The size and position of the video object shall be configured on a per-display basis. Systems that show the live video object in a separate window from the operator interface or on a separate monitor screen shall not be acceptable.
  8. Create displays in the graphic display-building editor using a web browser such as Microsoft's Internet Explorer without modification. All displays shall be usable in this manner, enabling operators to completely operate the system through a web browser if required. Displays shall incorporate data from an Intranet, the Internet, or ActiveX documents, along with other building data.
  9. Launch applications (such as Microsoft Word, Excel, custom help files, or any third-party applications) from a custom display. If supported by the application, it shall be possible to launch the application with a specified file opened within the launched application. Launching of such applications shall be possible from the operator workstation pull-down menus or from a push button on a custom display.

## 2.9 SYSTEM DATABASE

- A. Provide a real-time database incorporating data from analog, digital, or pulse inputs. The database shall be configurable by the end user without the need for any programming and shall be modified on-line without interrupting operation of the system. In addition to point-based information, the database shall provide historization capabilities for analog, digital, pulse, and event-based information. This information shall be accessible by all facilities of the system, such as custom displays, reports, trends, and user-written applications. The real-time database shall support collection of data and storage using the following structures:
1. Access point structures
  2. Analog point structures
  3. Status point structures
  4. Accumulator point structures



5. Virtual point structures
  6. Historical data structures
  7. Event data structures
  8. User defined structures
- B. Each of the point database structures shall be comprised as a composite point with a number of associated parameters, which shall be referenced relative to a single point ID name. Specifically, each of these parameters shall be accessible by various subsystems, such as the graphical operator interface, report generation system, and Application Program Interface, in a simple Point Parameter format without needing to know any internal storage mechanism.
- C. Store point data in a composite point database structure that provides a wide range of configurable information, including but not limited to:
1. Point ID name and description
  2. Multiple locations for data storage and device scanning addresses
  3. Scan period
  4. Multiple types and instances of alarms
  5. Multiple deadband or hysteresis settings (analog points)
  6. Monitoring and control access restriction information
  7. Location of operator alarm-handling instructions
  8. Location of ancillary information associated with the point
  9. A list of all recent events, a minimum of 10, pertaining to that point
- D. The LSMS system shall provide a means by which a number of alarm inputs, outputs, and other related points can be grouped together for more convenient monitoring and control without the need for custom graphics.
- E. In order to support other types of data, such as user-entered or calculated data from application programs, the system shall provide a user definable database area that can be fully integrated into the system. Data contained in this database shall be accessible by custom graphics, custom reports, application programs, and network applications using a network API.

## 2.10 REDUNDANCY

- A. System shall be capable of supporting Marathon everRun to provide redundancy for server failover.

## 2.11 DATABASE BACKUP AND RESTORE

- A. The system shall be capable of backing-up the database.
1. A copy of the database shall be created and stored in a Backup folder in the hard drive.
  2. The copy of the database shall be able to be copied to an external USB flash drive.
  3. The database backup shall be able to be scheduled and be done while the system is still running.
- B. The system shall be capable of restoring the database via a copy of the backup file.

## 2.12 SYSTEM DATABASE CONFIGURATION

- A. Provide a database configuration tool that allows configuration of all point records, printers, panels, and operator workstation connections. This utility shall be in the form of a relational database and operate in a true 32-bit graphical environment. The utility shall export information to and import information from Microsoft applications such as Microsoft Excel. Systems that do not provide support for Microsoft Excel in this respect shall not be acceptable.
- B. Users with sufficient security access shall configure the database while the system is on-line. Configuration shall not require any programming, compiling, or linking, and shall not require shutting down or restarting of the system. In addition, historical data collection shall not be interrupted for points not affected by configuration changes.
- C. Database configuration tool shall launch from the operator workstation interface. Utility shall configure database changes and download them either from the LSMS server directly or remotely via the network. Remote download applications shall be password protected.
- D. It shall be possible to modify a range of communications and other parameters for each device. The parameters of a particular device made available for modification shall be specific to the device or hardware item being configured—for example, baud rate, parity, data, and stop bit information in the case of serial devices. Hardware configuration utilities that rely solely on text-based configuration files shall not be acceptable.
- E. Provide documentation for the configuration utility on-line. Help facility shall operate using standard Microsoft features, such as context-sensitive help using the F1 function key.
- F. Utility shall reduce configuration time of the LSMS system. These features shall include adding multiple points and panels at once. Utility shall automatically increment names or numbers of any information that is required to be unique by the LSMS system (such as point names). User shall select multiple items (such as points) and then edit fields that are common to all selected items to assist in global changes. Standard copy and paste facilities shall be provided by the utility.
- G. Utility shall support free format text fields, which the user can use for additional information such as cabinet or wire numbers. These additional fields shall be simple extensions to existing items in the database such as LSMS points.
- H. Provide a filtering mechanism to enable the user to view only relevant information. The filter shall provide standard choices for the user to select, and provide user-defined filtering.
- I. Provide database management reports as standard. Utility shall provide support for ad-hoc reporting facilities for engineering use.

## 2.13 APPLICATION PROGRAMMING INTERFACE

- A. Two types of application programming interface (API) are required. The first is for applications written on the LSMS server and the second are for applications required to run on network-based clients (that are not necessarily operator workstations). The LSMS system APIs shall have support for either Visual Basic or C++, or both. Proprietary programming languages are not acceptable.

- B. The API on the LSMS server requires the following functions as a minimum:
  - 1. Read and write to points in the database
  - 2. Access to historical data
  - 3. Initiate supervisory control actions
  - 4. Access to the alarm and event subsystem
  - 5. Access to user-defined database
  - 6. Provide a prompt for operator input
  
- C. The API on the network-based clients requires the following functions as a minimum:
  - 1. Read and write to points in the database
  - 2. Access to historical data
  - 3. Initiate supervisory control actions
  - 4. Access to user-defined database

#### 2.14 SERVER SCRIPTING ENGINE

- A. The LSMS system shall extend its functionality by the addition of small script code to certain server functions. This will enable additional customer-specific functionality to be easily added to point, report, and server processing. For example, a script shall enable a calculation to be performed and a number of points to be controlled based on another point going into alarm state. Scripts shall be able to be attached to point processing, report generation, server startup and shutdown, or executed on a periodic basis.
  
- B. Provide a scripting engine that supports a standard scripting language such as Microsoft's VBScript. Access to the scripts shall be through an inbuilt scripting editor that provides key work support and syntax checking as well as an extensive range of online help, including a large number of worked examples. Proprietary scripting languages shall not be acceptable.
  
- C. Scripting functionality shall be in addition to a full Application Programming Interface as described in the Article above.

#### 2.15 DIAGNOSTIC CAPTURE TOOL

- A. Diagnostic information indicating the health of the system shall be viewable through a user interface and shall be exported as a standalone collection of material for later analysis. This information shall include:
  - 1. Communications traces to selected panels
  - 2. All system log files
  - 3. Details on system software installation
  - 4. Application status information

2.16 HISTORY MANAGEMENT

- A. Collection of historical point data shall be configurable as part of the point definition. Once configured, this data shall be collected automatically. Historical data collection shall be provided for both snapshots and averages with intervals ranging from 1 second to 2424 hours.
- B. Once assigned to history, point data shall be available by POINT.PARAMETER access used in conjunction with a history offset to locate the particular value of interest. The graphical operator interface, trend, report generation, and application interfaces shall access historical data.
- C. Modifications to the history collection of a point shall be possible on-line without the loss of previously collected data for the point being changed or any other points in the system currently being historized.
- D. History shall be archived to an alternative file system or offline media. Different archive settings shall be available for different history types.

2.17 TRENDING

- A. Provide flexible trending allowing real-time, historical, or archived data to be trended in a variety of formats. In addition, trend data types shall be combined to allow for comparisons between data, e.g., current real-time data versus archived data. The system shall provide trending capability with the following functions:
  - 1. Real-time trending
  - 2. Historical trending
  - 3. Archived history trending
  - 4. Trend scrolling
  - 5. Trend zoom
  - 6. Engineering unit or percent
  - 7. Cursor readout of trend data
  - 8. Trend comparisons between archived, real-time, and historical data (for example, this year vs. last year). Comparisons between the same point offset in time, or different points shall be possible.
  - 9. Trend de-cluttering via per-pen enable and disable on multi-plot style trends
  - 10. Independent Y-axis per point on multi-plot style trends. It shall be possible to display the Y-axis for any point on the trend by simply selecting the point using the mouse or keyboard.
  - 11. Copying the currently displayed trend data to the clipboard for pasting into a spreadsheet or document
- B. Configuration of trends shall only require the entry of the point name into the desired trend template to produce the trend. All trend configuration shall be possible on-line without interruption to the system. Historization of data shall not be affected by changes to trend configuration. Systems that only provide trending via a third-party package will not be acceptable.
- C. The system shall be able to present real-time, historical, or archived data in a variety of formats, including single, dual, and multiple value trends of up to eight points. For each trend set display,

it shall be possible for operators to configure the number of historical samples and ranges displayed. Points configured in trend sets shall be changeable on-line.

- D. Operators shall be able to zoom in on information displayed on trend sets for closer inspection by dragging out an area of interest with the mouse or other pointing device. From such a selection, it shall be possible to copy the underlying data to the Windows clipboard for subsequent pasting into a spreadsheet application such as Microsoft Excel 2000. Systems that do not provide support for Microsoft Excel 2000 in this respect shall not be acceptable.
- E. Scroll bars shall be available to move the trend set backwards and forwards across the historical records. The trend sets shall automatically access archived history files without operator configuration.
- F. Embed trend objects as part of custom displays. The following formats shall be available:
  - 1. Bar trend
  - 2. Line trend
  - 3. Numeric trend
  - 4. Tuning trend
  - 5. Pie trend
  - 6. X-Y plot

## 2.18 EVENT MANAGEMENT

- A. Log an event so that it is journalized in the event file and optionally printed on the event printer. The journal shall contain the following event information:
  - 1. Alarms
  - 2. Alarm acknowledgements
  - 3. Return to normal
  - 4. Operator control actions
  - 5. Operator login and security level changes
  - 6. On-line database modifications
  - 7. Communications alarms
  - 8. System restart messages
  - 9. Database changes
- B. Provide standard displays to show the current journal file with the most recent event at the top of the display. Page forward to display progressively older events. Sort and filter the journal directly on screen. Save filters for future use. Print filtered events as an event report directly from the event display. The event database entries shall contain the following information as a minimum:
  - 1. Time and date stamp
  - 2. Database partition code
  - 3. Source
  - 4. Operator
  - 5. Event type
  - 6. Condition
  - 7. Action
  - 8. Alarm priority

9. Description
  10. Value
  11. Engineering units
  12. Comments
- C. Sort events by time and date, database partition, or source of the event. Apply filters to the list of events to limit the view of events to those that match the filter. Filters may include multiple dimensions and wildcards and shall be saved and restored for reuse.
- D. Provide additional fields that are relevant for different types of events. It shall be possible to enter comments on all events so those operators can annotate an event with relevant information.
- E. Manually create an event if the operator wishes to record an incident on the site that is unrelated to system equipment.
- F. Event database shall be accessible from other subsystems, such as the operator interface, report generation, and application programmers' interface. It shall be possible to have an on-line event file as large as the disk capacity can accommodate. For example, given the appropriate disk space, it shall be capable of storing more than 1,000,000 events on-line.
- G. Event file shall store events online. The system shall automatically and manually archive these online events periodically, at a time period specified by the user. Operators shall be notified by an alarm that event archiving is required if manual operation is chosen. Events may be archived to tape or to other media such as CD, Zip drive, or another file system. If archiving does not take place, the event system shall continue to collect events until it reaches a nominated disk space limit. It shall then overwrite the oldest events until archiving takes place or more disk space is made available.
- H. Archived events may be restored to the LSMS at a later time if required for reporting purposes. Multiple archives shall be restored at any one time. LSMS shall indicate to the operator the range of events in a particular archive file.
- I. Event management system shall be fully integrated with the standard reporting system. The system shall automatically reference the restored archive file if a report is requested containing a time search window covered by the current archive file. Operator shall be able to restore previously archived files and review or print them from the operator workstations. It shall also be possible to directly generate a report from the event database filtered online without necessarily using the reporting system.

## 2.19 ALARM MANAGEMENT

- A. LSMS shall support the following different types of alarms for analog sensitivity values associated with smoke and heat detector points or any other analog point type. Any four of these alarms shall be assignable to each analog or accumulator point on an individual point basis as part of the point configuration process. Status points shall allow each individual state to be alarmed.
1. Two high-value alarms
  2. Two low-value alarms
  3. Two deviation alarms

4. Rate of change alarm
  5. Unreasonable value alarm
- B. Each monitored point in the system shall be assigned one of four alarm priorities to individual states. Within each of the four alarm types there shall be 15 sub-priorities available. Each alarm priority shall have a configurable color. The meaning of the priorities shall be as follows:
1. Journal: Changes of state shall be journalized to the alarm and event log and optionally printed on the alarm and event printer.
  2. Low: Change of state will generate a low priority alarm, which will appear on the alarm summary. Optionally, the alarm may be printed on the alarm and event printer or generate an audible tone.
  3. High: Change of state will generate a high priority alarm, which will appear on the alarm summary. Optionally, the alarm may be printed on the alarm and event printer or generate an audible tone.
  4. Urgent: This is the highest priority. Change of state will generate an urgent priority alarm, which will appear on the alarm summary. Optionally, the alarm may be printed on the alarm and event printer or generate an audible tone.
- C. It shall be possible to configure a time so that if a low priority alarm is not acknowledged within this time the alarm's priority is elevated to high priority. If a high priority alarm is not acknowledged within a configured time, its priority is elevated to urgent priority.
- D. For each alarm priority, it shall be possible to configure a point so that if any alarms of this priority occur, the point is controlled to the configured state. This could be used to drive external annunciators such as sirens or lights.
- E. When an alarm is acknowledged, it shall be possible to automatically issue a reset to a panel to indicate the alarm is acknowledged and to attempt to reset the alarm point.
- F. Alarms shall be annunciated at the operator workstation even if there is no operator currently signed on. This feature shall be available on network-connected operator workstations as long as the computer running the operator workstation software remains logically connected to the network. If the operator workstation is minimized in the Windows environment, then the operator workstation icon will indicate an alarm. An audible tone shall be able to be generated and this tone shall be specified by a "\*.wav" or other sound file for each alarm priority.
- G. Points shall be annunciated while in alarm. If a point is set to alarm-inhibited, the point shall no longer cause annunciation. If a point goes into an alarm state while inhibited and then is still in the alarm state when the point is set to alarm enabled, the point shall immediately cause annunciation. Alarms shall be annunciated by:
1. Most recent, highest priority alarm message appearing on dedicated alarm banner on the operator interface.
  2. Alarm message appearing on alarm summary display.
  3. Available tone—based on a "\*.wav" or other sound file for each alarm priority.
  4. Alarm message printed on the alarm printer.
  5. Alarm indicator flashing on the operator interface
- H. Assigning an alarm to the point shall automatically cause the system to perform the following actions when an alarm occurs:

1. The alarm shall be time-stamped to the nearest second and logged in the event database with the point name (source), alarm type, alarm priority, point description, new value, and engineering units.
  2. The point value that is in alarm shall turn red (or other configurable color) and flash on any standard or custom display using that point.
  3. An unacknowledged alarm entry shall be made in the system alarm summary for low, high, and urgent alarms.
  4. The audible alarm shall sound (if configured).
  5. The alarm annunciation indicator shall flash.
- I. Alarms shall be viewed in a consolidated alarm summary that shows all current or pending alarms on the system. This summary shall be sorted by time and date, database partition, or source of the alarm. The fields shown on the alarm summary shall be configurable and it shall be easy to move or change the alarms fields displayed. It shall be possible to apply filters to the list of alarms to limit the view of alarms to those that match the filter. Filters may include multiple dimensions and wildcards and shall be saved and restored for reuse. More detail about an alarm shall be obtained from a configurable detail screen that shows all fields associated with that alarm. Operators shall have the flexibility to add comments to the alarm, and these comments shall be stored with the alarm.
- J. A dedicated alarm banner shall appear on all displays showing either the most recent or oldest (configurable), highest priority, unacknowledged alarm in the system. Banner shall be clear when there are no unacknowledged alarms for the operator to process. An alarm indicator shall appear on all displays. This indicator will flash red (or another configured color) when there are any unacknowledged alarms pending in the system. Indicator will remain solid red if there are alarms that have not returned to normal but have been acknowledged. Indicator will be clear if there are no points in an alarm condition.
- K. Alarms shall be logged on the printer and event file for future retrieval in alarm reports or archived to removable media.
- L. By pressing a dedicated key at any time, the operator shall be able to view a display showing all currently active alarms. Alarm messages shall be color-coded showing priorities. Operator shall be able to view the alarms according to priority or sorted based on other fields. It shall be possible to acknowledge alarms from this display and go to the associated display defined for the point.
- M. On acknowledgment by the operator, the flashing indicator shall turn steady, and the point value shall remain red on any system or custom graphic. The acknowledgment shall be logged in the event database identifying the operator or station that acknowledged the alarm. If the point goes out of alarm before being acknowledged by the operator, the alarm shall be shown by a different indication and remain in the list until specifically acknowledged by the operator. If a point is not acknowledged within a configurable period of time, then an additional area based alarm can be generated. Provide for efficient alarm acknowledgement in the following ways:
1. Selecting any Point Parameter from a custom graphic and pressing the dedicated acknowledge push-button
  2. Selecting the alarm banner and pressing the dedicated acknowledge button



3. Selecting the alarm in the alarm summary display and pressing the dedicated acknowledge button
  4. Performing a page acknowledge from the alarm summary display
- N. The alarm summary shall filter the alarms displayed to the operator. Columns on the alarm summary shall be used as part of a filter, allowing sophisticated filters to be configured (e.g., all alarms from this particular point, with this value, during this period). Filters shall be saved and restored so that previously configured filters can be reused. It should be obvious to operators when a filter has been applied to the alarm summary.
- O. System shall allow the linking and display of digital video recordings pertaining to alarms. If there is any video footage in digital format that is relevant to an alarm, then the alarm summary shall indicate this by the use of a special icon on the alarm. By selecting the icon, the operator can then replay the relevant digital video footage of the alarm incident.
- P. The filtered alarm summary should be able to be printed directly as a report. From the alarm summary page, it shall be possible to view the current filtered list of alarms via a print preview button. From the alarm summary, it shall be possible to print the alarms directly using the Print button.
- Q. The LSMS system shall provide for an additional message to be tagged to the alarm. This message shall provide the operator with additional information on the alarm, but shall not clutter the alarm summary. It shall appear in a separate message summary at the same time as the alarm appears in the alarm summary. Messages can be pre-configured and then simply attached to individual points by means of a message ID.\
- R. LSMS shall provide advanced alarm management, which includes set stages of alarm handling. All actions shall be recorded in the event file for retrieval and auditing purposes. When an alarm is silenced, an instruction page for the alarm will be displayed. Alarm may then be acknowledged from this page and alarm handling action completed. Once the alarm is acknowledged and appropriate action taken, the operator may move to the response page to select from up to 100 user-defined responses to be logged in the event file. Alternatively, the operator shall enter his or her own response, which is logged in the event file. Simultaneously the alarm is removed from the alarm file or the point shall remain on the alarm summary until a manual reset operation is performed. It shall be possible to enable and disable this feature on a point-by-point basis, given the appropriate system privilege level. The stages are:
1. Silence alarm condition
  2. Acknowledge and action alarm condition
  3. Respond to alarm condition by using pre-defined responses
  4. Optionally reset alarm

## 2.20 MESSAGES

### A. Manual Initiation

1. System shall be capable of guiding the operator through all the necessary steps for initiating a message or incident.
2. System shall indicate with an icon or different color if a mandatory step is needed to proceed with an initiation process.

3. System shall provide a progress indicator of the message initiation process.
  4. A send button or initiate button will need to be clicked as the last step of sending out the message.
- B. Automatic Initiation
1. System shall be capable of activating a pre-configured message based on a receipt of a trigger or event from the system or a system device.
- C. System shall be capable of browsing current messages in progress with the ability to cancel, suspend, resume, and close the message.
- D. Message Content
1. System shall have the capability to create a message that could have one, all, or combination of the following information:
    - a. Text
    - b. Text-to-Speech
    - c. Audio
    - d. Video
  2. System shall be capable of scheduling a message is to be sent by at least date and time.
  3. System shall be capable of repeating the message multiple times.
    - a. System shall be capable of adding time between the repeated messages.
    - b. System shall be capable of providing standard text formatting such as font, color, style, size, and align.
    - c. System shall be capable of adding a signature (text of who sent the message) to the end of text or email messages.
    - d. System shall be capable of creating an audio message from an existing audio file.
    - e. System shall be capable of recording an audio message using a microphone.
    - f. System shall be capable of creating a message using a static image.
    - g. System shall be capable of creating a message using a movie file.
    - h. System shall have a built-in text-to-speech engine.
    - i. System shall be capable of installing 3rd-party text-to-speech engines such as Neo Speech and Acaplela.
- E. Escalation
1. System shall be capable of sending a message to next device on list or all devices if the current device has failed.
  2. System shall be capable of sending to other devices in a preconfigured order or to other recipients based on failure of initial devices or if lack of response from intended recipient (s).
- F. System shall be capable of sending a live announcement via a phone or microphone.
1. Live announcements shall be recorded for later playback.

G. Grouped messages

1. System shall be capable of grouping a set of messages under a distinct event or incident.
2. System shall have the capacity of at least 100 incidents or groups of messages.

2.21 REPORTING

A. System shall support a flexible reporting package to allow easy generation of report data. Reports shall include pre-configured standard reports for common requirements, such as alarm event reports and user-configured custom reports. Configuration of these reports shall only require entry of the schedule information and other parameters—such as point name or wildcard, filter information, time interval for search, and destination printer—to fully configure the report. Specifically, no programming or scripting shall be required. The following pre-formatted reports shall be available on the system:

1. Alarm and event report
2. Operator trail report
3. Point trail report
4. Alarm duration report
5. All point report
6. After hours alarm report
7. Point attribute report
8. Generic or custom report

B. Alarm event report: Produce a summary of all events of a specified type for nominated points occurring in a time period. Time period may be specified as an absolute start and end date and time, or as a period relative to the current time. Report shall be able to produce a summary of all changes made by a specific operator.

C. Operator trail report: Produce a summary of all operator actions relating to a specific operator in a specified period.

D. Point trail report: Produce a summary of all events of a specified type occurring in a period on nominated points.

E. Alarm duration report: Calculate the total amount of time a nominated point or group of points has been in an alarm condition over a given time period. Time period may be specified as an absolute start and end date and time, or as a period relative to the current time.

F. All point report: Produce a list of point information, including point name, description, point type, engineering units, and current values. Report configuration shall allow filtering based on a wide variety of criteria.

G. After hours alarms report: Produce of summary of all alarms occurring during the period specified by the operator as “After Hours.”

H. Point attribute report: Produce a summary of points selected by one of the following attribute criteria:

1. Out-of-service

2. Alarm suppressed
  3. Abnormal input levels
  4. In manual mode
- I. Generic or custom reports: Configure report-generation facilities to allow the production of custom reports. They may be configured at any time with the system on-line, and shall be capable of accessing any database values. At least two methods of custom report generation shall be available, including:
1. LSMS shall provide the facility for the use of Microsoft Excel as a reporting tool, allowing calculations such as summations, maximal, minimal, and standard deviations, and the production of graphs, charts, and tables. Data accessible for Excel reporting shall include alarms, events, and point parameter values. Systems that do not provide support for Microsoft Excel 2000 in this respect shall not be acceptable.
  2. LSMS shall provide selected data in an ODBC format for the purpose of extracting data and creating custom reports. It shall be possible to access tables of data from the LSMS through an ODBC compliant tool such as Crystal Reports. It shall incorporate the activation of custom reports created through the ODBC compliant tool through the standard LSMS report subsystem. A report detail display shall allow naming of reports, scheduling information, and the destination of the report. The report destination shall be a printer, operator interface, or internal file. The report output format shall be HTML (Hypertext Mark-up Language), Microsoft Word, or RTF format.
- J. Reports shall be activated in one or more of the following ways:
1. Periodic activation at user-specified intervals
  2. Operator demanded
  3. Event initiated, e.g., change in point value
  4. Application initiated
  5. Printed directly from the alarm and event summary

## 2.22 POINT INITIATED PROGRAMS (PIPS)

- A. In addition to standard point-processing functions, the system shall allow additional processing through the use of standard PIPS that may be attached to any points. Typical functions to be provided by these PIPS are listed below:
1. Maximum and minimum value
  2. Composite alarms
  3. Group alarm inhibit
  4. Report request by point change
  5. Application program request (by point value change or cyclic period)
  6. Alarm transportation
  7. Value transportation
  8. Door activity task request
  9. Security area seal and unseal
  10. Alarm or point value change graphic call-up
  11. Value change group or area alarm inhibit

## 2.23 HISTORICAL DATA ARCHIVING

- A. System shall support archiving of historical data to allow a continuous record of history to be built up over a period of time. Archived data may be stored on the hard disk of the system on a remote network drive, or it may be moved off-line to removable media such as floppy disk, cartridge tape, DAT tape, or optical disk. The number of archives maintained on the system before transferal to off-line media shall only be limited by the size of the hard disk or remote network drive. System shall permit the user to define the specific intervals of history to be archived to avoid archiving of unnecessary data.
- B. Once archived, the data shall be available for re-trending through the system trend facilities in combination with the current on-line history or other archives. Providing the archived history is present on the LSMS server's hard disk or remote network drive, the trend facilities shall be able to access it transparently for display, when a user scrolls beyond current on-line history limits.
- C. The system shall be capable of exporting bulk data to Microsoft Excel. As a minimum, the following shall be supported:
  - 1. Retrieval of data either periodically or snapshot
  - 2. Retrieval of data via POINT.PARAMETER requests
  - 3. Retrieval of tag names and descriptions
  - 4. Retrieval of historical data
  - 5. Write values from Excel back to the supervisory system
- D. Web-page controls and a web server interface to the LSMS shall be provided, allowing tenants or other users to monitor and control a variety of LSMS-supervised functions via their own web pages created for their own Intranet or Internet and viewed from a standard web-browser. It shall be possible to limit web browser access to LSMS facilities by means of standard web and networking techniques.
- E. LSMS shall provide for paging and external annunciation of configured points in alarm to alphanumeric pagers, digital mobile phones with text message (SMS) support, e-mail, and SNMP message. Each point's paging priority threshold shall be individually configurable, and individually enabled or disabled. Each external device configured in the system shall have individually selectable times and days of operation, an alarm priority threshold, and an alternative device for use in escalation of unacknowledged alarms.

## 2.24 INTEGRATION PROTOCOLS

- A. Buildings must be fully operational on the new Life Safety Management System before they are removed from the existing Honeywell XBSi system.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION:

- A. Installation shall be in accordance with the NEC (NFPA 70), NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer. Work shall be installed per latest NECA Standard of Good Workmanship in Electrical Contracting.
- B. Provide primary 120 VAC circuit for each LSMW. Provide an Uninterruptible Power Supply/ surge protector for each LSMW with minimum ratings of 1500VA/ 900-watts; 6-Outlet and 2-USB ports and internal/replaceable batteries.
- C. Integration with new LSMS:
  - 1. All new FACP's will be integrated into the new campus Life Safety Monitoring System as per the specifications with provisions made accordingly so that Phase 2 and 3 upgrades can be implemented smoothly once those buildings are complete. For initial installation of new FACP's in all buildings where new FACP will function as intermediary to existing building systems, Integration with the new Front End shall minimally include building alarm status (OK, Supervisory, Trouble, Alarm) shown as building outline filled with corresponding color (Green, Yellow, Orange, Red). Current and historical state of building system overall condition (OK, Trouble, Supervisory, Alarm)
  - 2. As buildings are fully retrofitted and transitioned to the new LSMS, Integration shall be made complete for those buildings as per the specifications. Schedule for Integration shall be concurrent with device installation on a per-building basis.

3.3 GENERAL TESTING:

- A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.
  - 1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
  - 2. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

3. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.
4. Test reports shall be delivered to the college as completed.

#### 3.4 ACCEPTANCE TESTING

- A. A written acceptance test procedure (ATP) for testing the system components and installation shall be prepared and submitted for review in accordance with NFPA 72 Chapter 7, and this specification. The contractor shall also be responsible for the performance of the ATP, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and programming.
- B. Each fire alarm control panel addressable point shall be initiated. The device location and description displayed at the LSMS must be confirmed correct and accurate.
- C. Each audio message shall be launched and confirmed correct at each building. (As applicable)
- D. A program matrix shall be prepared by the installing contractor referencing each event input to every output function affected as a result of an event condition.
- E. After testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall also state that all workstation functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.

#### 3.5 FINAL INSPECTION:

- A. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate that the systems function properly in every respect.

#### 3.6 DOCUMENTATION

- A. System documentation shall be furnished to the college and shall include but not be limited to the following:
  1. Factory system operation, installation and maintenance manuals.
  2. The ATP and confirmation of successful Acceptance Testing.
  3. Operational management procedures defined for usage and activation of the system features, including instructions for launching ECS messages.
  4. Printed list of pre-recorded messages.
  5. Record and as-built drawings.
  6. Record copy of the system specific software and license agreements, where applicable.
  7. Record of completion form and Warranty letter with service contact information.

3.7 INSTRUCTION:

- A. Provide instruction as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.
- B. The contractor and/or the systems manufacturer's representatives shall provide a PDF and hard copy of "Sequence of Operation."
- C. The manufacturer shall provide factory-trained instructor to give full instruction to designated personnel in the operation of the system installed. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. The manufacturer shall provide all designated personnel with a binder containing product specific training modules for the system installed.
- D. All training shall be held during normal working hours of 8:00 am to 4:30 PM weekdays.
- E. Required Instruction Time: Provide 16 hours of instruction after final acceptance of the system. The instruction shall be given during working hours on such dates and times as are selected by the owner. The instruction may be divided into two or more periods at the discretion of the owner. One training session shall be videotaped by the contractor. Required owner format shall be delivered to the owner.
- F. All training sessions shall be conducted following final system certification and acceptance. Two additional training sessions shall be provided six months after final system certification.
  - 1. Provide training for College's designated operating personnel for the Installed LSMS and include the following:
    - a. Explanation of drawings, operations and maintenance manuals
    - b. Walk-through of the system to locate control components
    - c. Operator workstation and peripherals
    - d. Operator control functions including graphic generation and field panel interface
    - e. Explanation of adjustment, calibration and replacement procedures

END OF SECTION 283111



SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, removing site utilities and abandoning site utilities in place.
7. Temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

- A. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
- D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.
- F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
  - 1. Use sufficiently detailed photographs or video recording.
  - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site.

1.7 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 Owner or authorities having jurisdiction.
- B. Utility Locator Service: General Contractor to include ground penetrating radar. Notify utility locator service and college for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- D. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.

7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust towards protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch (25-mm) blue vinyl tie tape flag around each tree trunk at 54 inches (1372 mm) above the ground.
- C. Protect existing site improvements to remain from damage during construction.
  1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 TREE AND PLANT PROTECTION

- A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by owner.
- B. All trees to be replaced shall be a minimum of five inches in diameter of a type approved by the owner.

### 3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
  - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Interrupting 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. Water utilities shall only be disconnected during approved period.
  - 2. Notify Engineer not less than two weeks in advance of proposed utility interruptions.
  - 3. Do not proceed with utility interruptions without Owner's written permission.
- D. Removal of underground utilities is included in earthwork sections and with applicable communications sections.

### 3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
  - 3. Use only hand methods for grubbing within protection zones around manholes and in congested areas shown on drawings.
  - 4. Chip removed tree branches and dispose of off-site.
  - 5. All trees that are removed as part of this project shall be replaced with a tree that has a minimum trunk diameter of five inches.
- 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 a loose depth of 8 inches (200 mm) and compact each layer to a density equal to adjacent original ground.

### 3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil at Carlton Avenue lot away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
  - 1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
  - 2. Do not stockpile topsoil within protection zones.
  - 3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
  - 4. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

### 3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and 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 along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

### 3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. 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.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000



SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Requirements: Add Raceways and Ducts.

1.2 DEFINITIONS

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

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

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

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

E. 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.

F. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

G. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
  - a. Personnel and equipment needed to make progress and avoid delays.
  - b. Coordination of Work with utility locator service.

- c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
- d. Extent of trenching by hand or with air spade.
- e. Field quality control.

#### 1.4 INFORMATIONAL SUBMITTALS

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

#### 1.5 FIELD CONDITIONS

- A. Utility Locator Service: Notify 811 "One Call" and TCNJ markout for area where Project is located before beginning earth-moving operations.
- B. TCNJ markout request is also needed for Private Utility, at least two (2) weeks prior to digging

### PART 2 - PRODUCTS

#### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- C. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- D. Sand: ASTM C 33/C 33M; fine aggregate.



## 2.2 ACCESSORIES

PART 3 - Detectable Warning Tape: Refer to section “Identification for electrical Systems”.  
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 earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 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.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

### 3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: As required for proper installation and meeting concrete encasement requirements where indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
  2. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on spacers selected for the application on an undisturbed subgrade.
  3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

### 3.6 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust and to protect soils from saturation.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
  2. Stockpile only soils needed for backfilling. Remove all excess materials from campus and dispose of appropriately. Stock piling excess soils anywhere on college property is prohibited.

### 3.7 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:
1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit, or concrete encasement where indicated.

- a. For Conduit not encased in concrete Carefully compact initial backfill evenly up on both sides and along the full length of conduit to avoid damage or displacement of conduit. Coordinate backfilling with testing.

E. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to minus 8” subgrade elevation. Top 8” is to be top soil over entire disturbed area.

3.8 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  1. Do not place backfill or fill soil 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.

3.9 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment and not more than 8 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
  1. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.10 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of 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.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- D. 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 materials to depth required; recompact and retest until specified compaction is obtained.

3.12 PROTECTION

- A. 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 greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Hot-mix asphalt paving.
  - 2. Asphalt surface treatments.
- B. Related Requirements:
  - 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
    - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
    - b. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include technical data and tested physical and performance properties.
  - 2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
  - 3. Job-Mix Designs: For each job mix proposed for the Work.
- B. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated:
  - 1. Paving Fabric: 12 by 12 inches minimum.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and testing agency.
- B. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the State Of New Jersey DOT for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Prime Coat: Minimum surface temperature of 60 deg F.
  - 2. Tack Coat: Minimum surface temperature of 60 deg F.
  - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
  - 4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
  - 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- C. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

- D. Mineral Filler: ASTM D 242/D 242M or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

## 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, PG 64-22.
- B. Asphalt Cement: ASTM D 3381/D 3381M for viscosity-graded material.
- C. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70.
- D. Emulsified Asphalt Prime Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Fog Seal: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- F. Water: Potable.
- G. Undersealing Asphalt: ASTM D 3141/D 3141M; pumping consistency.

## 2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires, asphalt shingles or glass from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Sand: ASTM D 1073 or AASHTO M 29, Grade No. 2 or No. 3.
- C. Paving Geotextile: AASHTO M 288 paving fabric; nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
- D. Joint Sealant: ASTM D 6690 or AASHTO M 324, hot-applied, single-component, polymer-modified bituminous sealant.

## 2.4 MIXES

1. Surface Course Limit: Recycled content no more than 10 percent by weight.
- B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
  1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
  - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
  - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
  - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
  - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
  - 2. Protect primed substrate from damage until ready to receive paving.

### 3.3 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
  - 2. Spread mix at a minimum temperature of 250 deg F.
  - 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
  - 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.



1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
  2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints [using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."] [as shown on Drawings.
  5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
  6. Compact asphalt at joints to a density within 2 percent of specified course density.

### 3.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent or greater than 100 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.6 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.

### 3.7 SURFACE TREATMENTS

- A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
- E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
  - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
  - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

- a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
  - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Replace and compact hot-mix asphalt where core tests were taken.
- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### 3.9 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Driveways.
  - 2. Roadways.
  - 3. Curbs and gutters.
  - 4. Walks.
- B. Related Sections:
  - 1. Section 033000 "Cast-in-Place Concrete for general building applications of concrete.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.
- B. WWM: Woven Wire Mesh

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- D. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
  - 1. Paving Bricks: EB Hartley color. Sample for confirmation.
- E. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer.
- B. Material Certificates: For the following, from manufacturer:
  1. Cementitious materials.
  2. Steel reinforcement and reinforcement accessories.
  3. Fiber reinforcement.
  4. Admixtures.
  5. Curing compounds.
  6. Applied finish materials.
  7. Bonding agent or epoxy adhesive.
  8. Joint fillers.
- C. Material Test Reports: For each of the following:
  1. Aggregates.
- D. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.
- E. Preinstallation Conference: Conduct conference at Project site.
  1. Review methods and procedures related to concrete paving, including but not limited to, the following:

- a. Concrete mixture design.
- b. Quality control of concrete materials and concrete paving construction practices.
2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
  - a. Contractor's superintendent.
  - b. Independent testing agency responsible for concrete design mixtures.
  - c. Ready-mix concrete manufacturer.
  - d. Concrete paving subcontractor.

## 1.7 PROJECT CONDITIONS

### A. Traffic Control:

1. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Bridges shall be provided over existing walkways during construction.
2. Installation of temporary walkways (Gravel) will be required to maintain traffic flow as best as possible during the work of each area. Keep work areas neat and organized at all times.
3. All areas to be secure with proper fencing and signage to prevent physical harm to pedestrian traffic. Advanced notice as to when the work will begin and when the work will be completed are required on signage provided by this contractor.
4. Movement of construction vehicles must be approved to assure safety to existing sidewalks and the college community.

- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F (4.4 deg C) for oil-based materials and not exceeding 95 deg F (35 deg C).

## PART 2 - PRODUCTS

### 2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

## 2.2 STEEL REINFORCEMENT

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- F. Deformed-Steel Wire: ASTM A 496/A 496M.
- G. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars[; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating]. Cut bars true to length with ends square and free of burrs.
- H. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- I. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- J. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- K. Zinc Repair Material: ASTM A 780.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, gray Portland cement Type I.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: Potable and complying with ASTM C 94/C 94M.



- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.4 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.5 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
  - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 4500 psi (31 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch (38-mm) nominal maximum aggregate size.
  - 2. Air Content: [6] [4-1/2] [3] percent plus or minus 1.5 percent for 1-inch (25-mm) nominal maximum aggregate size.
  - 3. Air Content: [6] [5] [3-1/2] percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

## 2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## PART 3 - EXECUTION

### 3.1 DEMOLITION

- A. Remove sidewalks as identified using equipment and machinery required to safely dislodge and remove from site.
- B. Great care must be taken to assure no damage is incurred to adjoining sidewalks, light fixtures, trees and minimal disturbance to landscaping and lawn areas. Repair all disturbed areas immediately after work of each area is done.
- C. All debris is to be hauled from the site on a daily basis.

### 3.2 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavings to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
  - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
  - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 312000 "Earth Moving."

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.4 GENERAL INSTALLATION

- A. All sidewalks and intersections are to contain 6" packed 3/4" clean crushed aggregate over compacted sub grade.
- B. All brick pavers in sidewalk are to utilize Unit Concrete Pavers (4x8x2), 3/4" as manufactured by EP Henry (Autumn Blend). Submit samples of proposed pavers for TCNJ approval prior to delivery to the site. Install pavers according to manufacturer's specifications.
- C. Concrete is to be 4,000 psi, rated class C and air entrained with fly ash. A 15% Class C fly ash mix is suggested, similar to a 1# fly ash to 1# cement ratio. Submit concrete mix design to TCNJ for approval and provide delivery tickets for each day's placement of concrete.
- D. 6x6 WWF Reinforcing is to be installed in low one-third of all concrete walks and concrete / brick walks (only if there is no re-bar).
- E. Expansion joints are to be placed a maximum of 20' on center utilizing preformed expansion joint material, PVC pipe for re-bar continuation, minimum 1/2" thick.
- F. Pavement slope: minimum 1/8" per foot.
- G. Create 1/2" radius along outside edge by use of an appropriate edging tool. Intermediate lines and details to match the existing prior to removal. Take pictures in order to assist in duplicating the work.
- H. Appropriate sealer to be applied to all new concrete via 1/2" smooth dowels at a minimum of 12" into the adjacent concrete and epoxy solid into the concrete, with a minimum of 12" into the new concrete.
- I. Topsoil and seed / hay (or mulch) per existing conditions all edges of new walkways immediately upon final cleanup of each area.

### 3.5 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.
- F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

### 3.7 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
  - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
  - 2. Provide tie bars at sides of paving strips where indicated.
  - 3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  - 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
  - 1. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
  - 2. Extend joint fillers full width and depth of joint.

3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
  4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

- K. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
  
- L. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.9 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
  
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - 2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
  - 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.10 CONCRETE PROTECTION AND CURING

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

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

- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

### 3.11 CONCRETE DETAILS (LARGER THAN 8 FEET WIDE)

- A. One foot concrete border to be installed on outside of brick pattern.
- B. Border to be 12” thick reinforced with #4 and #5 rebar on 24” centers and 18” centers respectively. See detail 10 on drawing M-12.
- C. Pavers to be installed on 3/4” of sand over 6 inches of concrete reinforced with #4 and #5 rebar on centers as noted above.
- D. Concrete inside brick pavers is to be minimum 8” thick reinforced with #4 and #5 rebar on centers as noted above.

### 3.12 CONCRETE DETAILS (LESS THAN 8 FEET WIDE)

- A. Concrete is to be 5 inches thick across entire slab.
- B. Concrete sidewalk, 4,000 psi class C air entrained with 6”x6” WWM in lower one-third of slab.
- C. 1/2” preformed joint filler expansion joints required.

### 3.13 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
  - 1. Elevation: 3/4 inch (19 mm).
  - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
  - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/2 inch (13 mm).
  - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
  - 5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
  - 6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
  - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
  - 8. Joint Spacing: 3 inches (75 mm).
  - 9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
  - 10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
  - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.



- I. Prepare test and inspection reports.

3.15 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313