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SECTION 01010

SUMMARY OF WORK

PART 1  GENERAL

1.01 DESCRIPTION OF WORK

A. This specification covers contracts representing significant elements of work for each Contractor in the SEPTA Market Frankford Line 5th Street/Independence Hall Station Enhancement Project. The work will be executed through multiple prime contracts representing significant elements of work for each Contractor. The Work shall be performed concurrently and in close coordination with the respective Prime Contractors listed in these construction documents, and possibly other trades working at the site. The Contractors for this project include:

1. Contract or for General Construction Work (to be known as "General Contractor" - GC).

2. Contract or for Mechanical Construction Work (to be known as "Mechanical Contractor" - MC).

3. Contract or for Electrical Construction Work (to be known as "Electrical Contractor" - EC).

4. The General Contractor shall be designated the coordinating contractor.

1.02 RELATED WORK

Agreement

Section 01011: Summary of Project
Section 01025: Measurement and Payment
Section 01041: Project Coordination
Section 01060: Regulatory Requirements and Safety
Section 01066: Subway/Elevated Division Safety Requirements
Section 01400: Quality Requirements
1.03 QUALITY CONTROL AND QUALITY ASSURANCE

A. Each prime contractor will assume responsibility for executing a quality control and quality assurance program. This program's basic form will be specified in his Quality Control Plan as submitted under Section 01400. Each prime contractor shall be responsible for requiring all subcontractors and suppliers to adhere to his quality assurance program and participate in quality assurance activities.

B. If a project is governed by “Buy America” requirements, SEPTA will require documentation to confirm the country of origin of all applicable products and materials. Each prime contractor is responsible for communicating Buy America requirements to his subcontractors and suppliers. The lack of sufficient documentation may be grounds for rejecting a product or material.

C. Quality activities will be documented by the contractor. SEPTA may audit the contractor's quality assurance and quality control activities. Each prime contractor will make his and his subcontractor's, applicable documentation available to SEPTA.

D. Each prime contractor, and their subcontractors, is required to cooperate fully with testing and inspection activities carried out by SEPTA and its agents. The contractor will provide the SEPTA PM with adequate (as determined by the SEPTA PM) notification, for all activities which require testing and/or inspection. For all inspections and testing required by code, work may not proceed until this testing and inspection has been completed.

E. Once a product or material has been accepted through the Submittal process, no substitution of this material or product will be allowed without resubmitting it following the provisions of Section 01300. SEPTA reserves the right to require removal of any non-reviewed material and product.

1.04 CONTRACTOR RESPONSIBILITIES

A. Furnish all materials, tools, equipment, supervision, administration and transportation, and perform all labor and services necessary to furnish, deliver, construct, install, connect and/or to interconnect and test as required to complete all work described in the Specifications and indicated in the Contract Drawings.

Each contractor shall be aware of, and be familiar with, the responsibilities and work of the other contractors especially with regard to the sections of Division 1, which pertain to all contracts. In addition to the responsibilities shared by each prime contractor, the coordinating contractor shall have additional responsibilities as specified in the contract documents.

B. Each contractor is responsible for securing and paying for all necessary permits and approvals required to complete the work. No work may
commence on site without securing and paying for the necessary approvals including but not limited to:

1. Permits
2. Governmental Fees
3. Licenses
4. Property stakeholder coordination

C. SEPTA Notification

1. Give written notices necessary for, and incidental to, the due and lawful prosecution of the Work.
2. Provide fourteen (14) days notification to SEPTA and testing agency for all construction work which requires observation, testing and/or testing.
3. Notify the Project Manager at least fourteen (14) days in advance of the date the individual construction stages and/or elements will be fully complete and ready for inspection.
4. Notify the Project Manager at least fourteen (14) days in advance of the date the entire work will be substantially complete and ready for inspection.
5. Notify the Project Manager at least twenty-one (21) days in advance of the date the entire work will be complete and ready for final acceptance inspection

D. Utility Notification

Known existing utilities may be indicated on the Contract Drawings but the contractor may not interpret this information as either complete or accurate. Regardless of those shown on the drawings, the contractor must identify and verify the location of all existing utilities prior to working by following applicable regulations and procedures, such as contacting the PA One Call system and asking SEPTA personnel to identify utilities at the site.

The contractor shall determine ownership of all utilities and notify utility owners prior to intended start work date. Deliver a copy of this notice to the Project Manager within eight (8) hours of the submittal of the notification.

E. Protection and Repair of the Work and Adjacent Property

1. Prior to the commencement of Work, the contractor and the SEPTA Project Manager shall examine the site and document the condition of all areas not intended to be changed by the project. Depending on the scope of work, this may include features such as sidewalks, driveways, roadways and adjacent facilities.
2. The contractor must repair any damage to property caused, directly or indirectly, by the actions of the contractor to the satisfaction of the SEPTA
PM (and property owner if the damage is to [property not owned by SEPTA) and at no cost to SEPTA

3. Until Final Acceptance of the Work by SEPTA, the Contractor(s) shall be responsible for maintaining the executed work in its finished condition as determined by the SEPTA PM. All work shall be restored to its finished condition prior to final acceptance at no expense to SEPTA.

F. Support of Existing Structures & Right of Way

1. Existing structures, adjacent to the project work area, must be supported adequately utilizing underpinning, shoring and other temporary stabilization measures. A plan to execute this temporary support and stabilization must be approved by the SEPTA PM prior to any excavation commencing. At the discretion of the SEPTA PM, the contractor may be required to have this plan prepared and sealed by a licensed engineer.

2. Under no circumstances excavate in the vicinity of track, embankment and right-of-way without the prior approval of the SEPTA PM.

G. Contractor’s Field Staff

1. The Superintendent shall have demonstrated competency in the Work of the project, including, but not limited to:
   a. Concrete restoration
   b. Artistic painting on brick surface
   c. Application of fluid-applied membrane system tunnel waterproofing
   d. Sitework including excavation, backfill, and compaction
   e. Removal/reinstallation of flagstone, cobblestone, and masonry sidewalks
   f. Removal/reinstallation of granite curb

2. Safety Officer: The Contractor shall assign a designated on-site Safety Officer. The Superintendent may perform the duties of the Safety Officer in addition to their own. The presence of the Safety Officer at the site is mandatory while work is being performed.

3. Quality Manager: The Contractor shall assign a Quality Manager for the duration of the work. The Superintendent may perform the duties of the Quality Manager in addition to their own. For a definition of the responsibilities of this position see section 01400.

5. Project Coordinator

The Project Coordinator shall coordinate the prosecution of the Work with prime contractors, public utilities, governmental bodies, (National Park Service, Wells Fargo / American Bible Society, Museum of American
Jewish History), SEPTA Operations and other contractors having access; The Project Coordinator will be responsible to either eliminate or minimize, as possible, delays in the Work and conflicts with those utilities, governmental bodies and contractors. This coordination may include preparation of diagrams and delivery schedules, and control of site utilization, from beginning of construction activity through project closeout and warranty periods.

6. Staff Qualifications

The work of this contract requires specified experience in description of the specialized work of the contract. The positions referenced above are considered key personnel and the review of their resumes and experience is a responsibility requirement under paragraph 4d 6) of the Instructions to Bidders. The lowest bidder shall furnish SEPTA with the resumes for the people who will hold the above positions within five (5) days of receipt of SEPTA’s written request.

If, in the course of the work, these individuals are proposed to be replaced by the Contractor and/or SEPTA deems that their work is no longer satisfactory, the terms of the Paragraph VIII K of the Agreement will be invoked.

H. SEPTA Construction Sustainability Policies

SEPTA has adopted a series of sustainability policies which it expects its contractors to follow. These include but are not limited to the following:

a. Building Site Waste Management - Within 10 days of Notice To Proceed, and before any site work begins, the contractor shall submit a building site waste management plan. The plan shall specify which site debris shall be recycled, reused or otherwise diverted. The goal of this plan shall be to reuse or salvage 75% of the land clearing debris including rock, trees, stumps and associated vegetation and 100% of excavated soils. Any materials which are disposed of off-site must meet all applicable regulations and be specifically approved by the SEPTA project manager. For material which is disposed of off-site, the contractor will be responsible for chain of custody documentation.

b. Material and Waste Management – Within (10) days of Notice to Proceed, and before any site work begins, the contractor shall submit a construction material and waste management plan. The plan shall specify which construction and demolition materials shall be recycled, reused or otherwise diverted. The goal of this plan shall be to divert 50% of nonhazardous materials and waste (measured by weight or volume) from landfills unless the local municipality has designated a greater amount.
c. Sustainability documentation – All sustainability strategies which are fulfilled by the contractor’s actions must be documented to the satisfaction of the SEPTA project manager.

1.05 SEPTA RESPONSIBILITIES

A. SEPTA shall, furnish free of charge to the Contractor, two (2) electronic sets and two (2) hardcopy sets of the Contract Documents including full size Contract Drawings, Specifications and Addenda, and/or conformed Contract Documents. Additional copies are available from Project Manager at cost of reproduction.

1.06 CONTRACTOR’S USE OF WORKSITE

A. Site availability and access to worksite

1. The Contractor(s) shall confine operations at the site to areas permitted by law, ordinances, and permits.

2. Keep existing driveways, entrances and exits serving the site, and facilities on the site, clear and available at all times, except as otherwise specified.

3. The Contractor shall not interfere with SEPTA or public circulation by the storage or staging of equipment or material. SEPTA reserves the right to require the contractor to relocate equipment or material immediately and at any time even if the current location has been previously approved.

4. Keep the entire worksite available for the SEPTA’s operations during the construction period, or as otherwise noted in the construction phasing and/or the contract documents.

5. Each Contractor will not interfere with access to adjacent properties or structures without written permission from the affected property owner. Each contractor will cooperate with work executed by adjacent property owners and tenants for the duration of the project.

6. Contractor shall coordinate removal, relocation, and/or protection of existing site features and furniture with property Owner, including, but not limited to: Indego Bike Rack, newspaper boxes, bus shelter, etc.

B. Storage of materials and equipment and deterring vandalism

1. Consider the safety of the Work, and that of people and property on and adjacent to the worksite, when determining amount, location, movement, installation, and use of materials and equipment on worksite. All storage and staging areas must be approved by the SEPTA PM.

2. Do not load finished Work with equipment and products that would
endanger the integrity of the finished Work.

3. Move stored products as often as necessary if it interferes with foreseeable operations of SEPTA, public and private utilities, and other Contractors at no additional expense to SEPTA. Security of stored materials shall be the Contractor’s sole responsibility. Secure additional storage and work areas if needed for construction operations at no additional expense to SEPTA.

4. The Contractor will take precautions to prevent vandals from placing loose construction debris, supplies and equipment into positions that might foul the track. These steps shall include, but not be limited to, securing movable items, like construction fencing and scaffolding, and storing debris and material in fenced & locked enclosures. Failure to take adequate steps may result in the contractor having to go to the job site and secure these materials during non-construction hours, at no cost to SEPTA and SEPTA will hold the Contractor responsible for any damage or injury caused, or contributed to by this failure.

C. Protection of the public & SEPTA

1. Protection of the general public and SEPTA operations from construction-related activities shall always have the highest priority. Any work on streets or access ways which could affect traffic or pedestrian access must receive prior approval by the SEPTA. Conduct work on streets and access ways on SEPTA property in a manner, which will ensure that pedestrian and vehicular traffic will either not be obstructed or obstructed to the least possible degree. Employ flagmen where required by ordinance or to create a safe job site. Flagmen working on state roadways shall be state trained and/or authorized.

D. Construction operations requiring SEPTA service interruptions and/or utility interruptions must meet the following requirements:

1. Should any temporary disruption of SEPTA's operations and/or use of the electric, water or telephone utilities at such site be necessary, it will be undertaken only pursuant to reasonable notices (not less than fourteen (14) days) given to the Project Manager and shall not continue beyond the previously agreed-upon period, without further written concurrence from SEPTA.

E. In order to minimize the impact of the work on the Public, the Contractor may be required to cease operations during special events held in the vicinity of Independence Mall including, but not limited to, the events celebrating the 4th of July.
1.07 SEPTA OPERATIONAL CONSTRAINTS

A. Holiday Service - SEPTA will prohibit service shut downs, and diversions on certain Holidays and Holiday weekends. Holidays include Memorial Day weekend, the Welcome America Celebration one week before the Fourth of July weekend, the Fourth of July (and the Fourth of July weekend, if applicable), and Labor Day weekend. Outages, shutdowns and diversions shall not be permitted during the “Holiday Season” which is defined as the period starting 5:01 am on the Wednesday before Thanksgiving Day until January 2, inclusive.

B. SEPTA reserves the right to return any track to service without prior notification at any time and make other adjustments as needed to facilitate operations.

1.08 WORK SEQUENCE AND CONSTRUCTION PHASING

The work is divided into four (4) construction phases spanning 550 calendar days. The scope of the work for each phase consists of all work inside and outside the designated areas that is required for the occupancy of the designated areas; this includes functional testing and acceptance of all station systems. The Contractor shall complete all work in a phase and remove all temporary barricades in that phase before starting work on the next phase, unless given permission by SEPTA. The following descriptions of the phase work are intended to provide a general orientation and sequence only; they are not to be interpreted as limiting the scope or defining the means and methods in a phase.

A. The Staging and Phasing Plans, which are shown on the drawings, have been developed to ensure public access to SEPTA’s station facilities throughout the period of construction. The construction staging shall include temporary lighting, signage, access, etc as determined by the SEPTA Project Manager at no additional cost to SEPTA. The Construction Phasing Plans were developed to establish a minimum level of detail to ensure that the construction activities can be accomplished in an orderly and timely manner within the specified construction schedule. The Coordinating Contractor shall submit a detailed Phasing Plan to SEPTA for review and concurrence within twenty-one (21) days of Notice to Proceed (NTP). Only with SEPTA concurrence will the Contractor be permitted to deviate from the Construction Phasing Plans. The construction phasing is not intended to restrict the scope of Work or to relieve the Contractors from their obligations to minimize interference with SEPTA’s normal operations.

B. The work sequence for the project is as follows:
Phase 1
This phase includes, but is not limited to, street level improvements along the south side of Market Street including, but not limited to:
1. Street level
   a. Stair headhouse (southwest corner only)
   b. Stair repair/replacement
   c. Curb bumpout
   d. Station waterproofing
   e. Pavement repair/replacement
   f. Sidewalk repair/replacement
   g. Curb ramps
   h. Pavement striping
   i. Architectural finishes
   j. Architectural amenities
   k. Signage (way finding)
   l. Lighting, power, communications
   m. Security
   n. Technology
   o. Fire Alarm
   p. Traffic signal
   q. Landscaping
   *Stair and hallway shutdown required for construction of headhouses.

Phase 2
This phase includes, but is not limited to, mezzanine and platform level improvements on south side of Market Street, including, but not limited to:
1. Stairways corridors and mezzanines
   a. Waterproofing (interior)
   b. Concrete restoration
   c. Stair repair/replacement
   d. Architectural finishes (ceilings, walls, floors)
   e. Ornamental fencing
   f. Lighting, power, communications
   g. Security
   h. Technology
   i. Fire Alarm
   j. Signage (way finding and advertising)
2. Platform (paid, non-paid, and back-of-house areas)
   a. Concrete restoration
   b. Waterproofing (interior)
   c. Replacement of rain water collection system
   d. Restroom upgrades
   e. Fareline realignment
   f. Lighting, power, communications
   g. Security
   h. Technology
i. Fire Alarm
j. Architectural finishes (ceilings, walls, columns, floors)
k. Architectural amenities (receptacles, benches)
l. Signage (way finding and advertising)
m. Art in Transit

3. Track area
   a. Waterproofing (interior)
b. Concrete restoration
c. Trench drain cleanout
d. Architectural finishes
e. Signage (way finding and advertising)
f. Power distribution
g. Communication distribution
h. Security distribution
i. Technology distribution
j. Fire alarm distribution

*Track outage required for demolition/construction within track fouling area.

Phase 3
This phase includes, but is not limited to, street level improvements along the north side of Market Street including, but not limited to:

1. Street level
   a. Stair headhouse (northwest corner only)
b. Stair repair/replacement
c. Curb bumpout
d. Station waterproofing
e. Pavement repair/replacement
f. Sidewalk repair/replacement
g. Curb ramps
h. Pavement striping
i. Architectural finishes
j. Architectural amenities
k. Signage (way finding)
l. Lighting, power, communications
m. Security
n. Technology
o. Fire Alarm
p. Traffic signal
q. Landscaping

*Partial station shutdown required for construction of headhouses.

Phase 4
This phase includes, but is not limited to, mezzanine and platform level improvements on north side of Market Street, including, but not limited to:

1. Stairways corridors and mezzanines
a. Concrete restoration
b. Waterproofing (interior)
c. Stair replacement
d. Architectural finishes (ceilings, walls, floors)
e. Ornamental fencing
f. Lighting, power, communications
g. Security
h. Technology
i. Fire Alarm
j. Signage (way finding and advertising)

2. Platform (paid, non-paid, and back-of-house areas)
a. Concrete restoration
b. Waterproofing (interior)
c. Replacement of rain water collection system
d. Restroom upgrades
e. Fareline realignment
f. Lighting, power, communications
g. Security
h. Technology
i. Fire Alarm
j. Architectural finishes (ceilings, walls, columns, floors)
k. Architectural amenities (receptacles, benches)
l. Signage (way finding and advertising)
m. Art in Transit

3. Track area
a. Waterproofing (interior)
b. Concrete restoration
c. Trench drain cleanout
d. Architectural finishes
e. Signage (way finding and advertising)
f. Power distribution
g. Communication distribution
h. Security distribution
i. Technology distribution
j. Fire Alarm distribution

*Track outage required for demolition/construction within track fouling area.

C. Coordinate timing (concurrently) of partial station shutdown and track outages to limit disturbance to SEPTA operations.

D. The actual construction activities interfering with SEPTA operations and passenger movement shall not begin until:

1. The Contractor provides a written plan (site specific work plan) to SEPTA indicating impact to passenger flow and SEPTA operations. Such plan
shall include remedial solutions acceptable to SEPTA.

2. The plan is approved in writing by SEPTA. Contractor shall be responsible for revision and resubmittal of the plan until it is approved by SEPTA.

E. If the plan calls for the Contractor to gain access to track or facilities, operational constraints may delay actual occupancy, or require the Contractor to give up occupancy early, for a period usually not exceeding one (1) hour.

F. Coordinate temporary removal and relocation of Indego Bike Share at northwest corner of 5th & Market Streets with applicable parties.

G. Coordinate temporary relocation / protection of existing street furniture, i.e. newspaper boxes, etc.

H. Coordinate relocation of pedestrian traffic signals with Philadelphia Streets Department and PennDOT.

I. Coordinate construction staging and phasing with local tourist attractions, i.e. buses, trolleys, horse & carriage.

J. Coordinate work and phasing with concurrent and/or future work, identified in section 1.11, below.

K. Before starting work on a construction phase, the Contractor may submit a written request to SEPTA to amend or adjust the phasing plan. The criteria detailed below must be satisfied in the proposed amendment.

Operational Criteria:

1. Passenger trains operate between the hours of 4:30 a.m. and 12:45 a.m. weekdays on a daily basis through. There is one (1) eastbound track, toward Frankford; and one (1) westbound track, toward 69th Street.

2. Holiday Service: SEPTA will prohibit service outages, service shut downs and diversions on the following Holidays and Holiday weekends:
   a. Memorial Day weekend
   b. The Welcome America Celebration one week before the Fourth of July weekend
   c. The Fourth of July (and the Fourth of July weekend, if applicable)
   d. Labor Day weekend
   e. The Holiday Season defined as the period between 5:01 a.m. on the Wednesday before Thanksgiving Day and 5:01 a.m. on January 2, inclusive.
3. Track Outages:
   a. A track outage is required in order for the Contractor to a) occupy a track area or b) work or operate equipment within four (4) feet horizontally from the edge of platform.
   b. Track outages shall conform to the Requirements of paragraphs below and shall be arranged in accordance with the procedures of Section 01100.
   c. Only one track may be taken out of service at a time.
   d. The Contractor may request additional track outages beyond the dates established at an additional cost $250.00 per outage for the Transportation Manager and $460.00 per outage for the Power Personnel.

4. Station system installations (Fire Alarm System, Fire Suppression System, Closed Circuit TV Surveillance System, AVPA System, etc.) shall be coordinated with other Prime Contractors.

5. Work at street level shall be performed prior to associated stair corridor and platform level improvements.

6. Requests for temporary closure of stair passageways shall be requested in writing a minimum of sixty (60) days prior to closure.

7. Maintain a minimum of two (2) fare gates per platform operational at all times.

8. Maintain a clear path of egress at all times from platform level to street level.

9. Maintain access and a path of egress to and from elevators at all times.

10. Provide protected walkways for pedestrian crossing at intersections.

11. Only one (1) lane of Market Street may be closed at a time.

12. Road work within 5th Street right-of-way may only be performed at night. Maintain a minimum of at least one (1) lane unobstructed during work. Restore traffic lanes in time for morning rush hour.

Review Procedures:

The actual construction activities interfering with SEPTA operations and passenger movement shall not begin until:

1. The Contractor provides a written Work Plan and schedule to SEPTA
indicating impact to pedestrian movement at street level, passenger access to the station, passenger flow within the station and SEPTA operations. The Work Plan shall include alternates and remedial solutions acceptable to SEPTA.

2. The plan is approved in writing by SEPTA. Contractor shall be responsible for revision and resubmission of the plan until it is approved by SEPTA.

3. All temporary signs are installed to the satisfaction of the SEPTA Project Manager.

1.09 DAMAGES FOR FAILURE TO RETURN TO SERVICE

A. The damages for failure to return rail service at 4:30 a.m. for any given outage will start at $1,250.00 for the first four (4) hours. Additional cost will be assessed as the need for additional services are required to maintain an equivalent level of service using buses.

1.10 SEPTA OCCUPANCY AND USE

A. Portions of the Work may be placed in operation by SEPTA in advance of the completion of all Work. Occupancy and/or utilization of parts of the Work by SEPTA will not relieve the Contractor of responsibility for proper integrated completion of all parts of the Work, nor shall it act to relieve the Contractor of any responsibilities under the Contract Documents for warranty of the Work.

1.11 CONCURRENT OR FUTURE WORK

A. Bus Shelter Replacement at NE corner of 5th & Market Streets
   Designer: Amy Balaweuder, P.E.
   Firm: Intersection Co.
   Owner: City of Philadelphia, Office of Transportation & Infrastructure Systems
   Anticipated Design Completion Date: TBD
   Contractor/Installer: TBD
   Anticipated Construction NTP: TBD
   Anticipated Completion Date: TBD

B. Faith and Liberty Discover Center at NE corner of 5th & Market Streets
   Designer: SaylorGregg, a studio of Jacobs Wyper
   Owner: American Bible Society
   Anticipated Design Completion Date: April 2017
   Contractor/Installer: TBD
   Anticipated Construction NTP: May 2017
   Anticipated Completion Date: September 2018
1.12 EXISTING CONDITIONS

A. The existing conditions represented in the Contract Drawings are based on the best available information obtained from one or any combination of the following sources: field survey, as-built documents, reference drawings, and/or visual investigation.

B. The contractor is responsible for verifying the conditions presented. If verified conditions are close to those represented on the Contract Drawings, the Contractor shall, in addition to reporting the verification to the Project Manager, proceed with the Work at no additional cost to SEPTA. If conditions are significantly different to those presented on the Contract Drawings, the Contractor shall, in addition to reporting the verification to the Project Manager, submit a detailed scheme and associated cost for completing the required work for review and comment. The Contractor shall allow twenty-one (21) days for review and comment.

C. The Contract Documents establish specific criteria and standards of performance. The Contractor shall use its discretion to determine means of compliance and is responsible for coordinating with other Contractors at the site in order to achieve compliance.

END OF SECTION 01010
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SECTION 01011
SUMMARY OF PROJECT

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

SEPTA’s 5th Street Station is a subway station owned and operated by Southeastern Pennsylvania Transportation Authority (SEPTA) that serves the Market-Frankford Line. This 51,000 SF station is located below the 5th and Market Street intersection in the historic Olde City section of Philadelphia. The station was originally opened to passenger service as part of the Market Street Subway in 1908 and substantially modified with the creation of Independence Mall in the 1950’s, rehabilitated in 1974 as part of the city’s preparations for the bicentennial, in 1997 for SEPTA’s Automatic Train Control System upgrade, and in 2010 for the installation of two (2) elevators and the construction of the National Museum of American Jewish History.

Project Location: 5th Street / Independence Hall Station
SEPTA Market-Frankford Line (Blue Line)
500 S. Market Street, Philadelphia PA 10106
City of Philadelphia, Philadelphia County
Tax Parcel: 884510110

The station is accessible by four (4) stairways located at each corner of the intersection. Two (2) elevators access the platform level, located on the northwest and southwest corners of 5th and Market streets. The station is approximately 350'-0" in length (east-west), 62'-0" in width (north-south), and is located one-story below street level. The platform is approximately 19'-0" below grade, and the track is located approximately 23'-0" below grade. There is one (1) eastbound track, toward Frankford; and one (1) westbound track, toward 69th Street.

The intent of this renovation is to create a station experience that is an appropriate gateway to Independence Mall and historic Philadelphia. Along with architectural enhancements this design we will be addressing the typical state of good repair items required within a station that is over 100 years old including: mitigating water infiltration, crack and spall repair.

Project Scope
The following project construction scope includes, but is not limited to:

1. Street level improvements:
   a. Temporary maintenance and protection of pedestrian and vehicular traffic.
   b. Temporary signage.
   c. Temporary relocation and reinstallation of newsstands, bus shelters.
   d. Selective demolition of existing sidewalks, curbs and street pavement.
   e. Protection of underground utilities.
   f. Replacing waterproofing layer of station roof.
   g. Repairs to and/or replacement of existing street-to-mezzanine stairs and railings.
   h. Construction of stair impact resistant barrier walls and ornamental fencing.
   i. Construction of two (2) headhouses (west corners only). Provide new
LED lighting fixtures and control devices for the headhouses.

j. Installation of curb bumpouts at the western corners of 5th & Market streets.

k. Construction of sidewalk, curbs and street pavement.

l. Pavement markings and striping.

2. Stair corridor and mezzanine level improvements:
   a. Temporary signage and barricades.
   b. Selective demolition of existing walls, floors, finishes.
   c. Selective demolition of existing stairs to platform level.
   d. Demolition of existing light fixtures and related wiring, conduit, junction boxes, and lighting control devices.
   e. Demolition of miscellaneous electrical equipment with associated conduits and wires.
   f. Structural repairs and concrete restoration.
   g. Waterproofing.
   h. Construction or refurbishment of new stairs and handrails to platform level.
   i. Finishes, including floors, column covers, walls, painted ceilings.
   j. Prep for painting. Refer to G002 for locations of identified lead paint.
   k. Provide new LED lighting fixtures.
   l. Provide power supply and receptacles for information booths.
   m. Security.
   n. Signage.
   o. Electrical Work.
   p. Mechanical/Plumbing Work.

3. Platform level improvements:
   a. Temporary signage and barricades.
   b. Selective demolition of existing walls, floors, finishes.
   c. Selective demolition of existing walls, floors, finishes, cashier’s booths.
   d. Demolition of existing light fixtures, and related wiring, conduit and junction boxes.
   e. Demolition of receptacles for existing water boxes.
   f. Demolition of associated conduits and wires for existing cashier booth and fare line.
   g. Selective demolition of existing electrical panel boards.
   h. Demolition of existing toilet rooms.
   i. Structural repairs and concrete restoration.
   j. Waterproofing.
   k. Construction of new platform slab.
   l. Construction of cashier’s booth, fare line, security fencing and gates.
   q. Construction of new toilet rooms and janitor’s closets.
   r. Prep for painting. Refer to G002 for locations of identified lead paint.
   s. Finishes, including floors, column covers, walls, painted ceilings.
   t. Painted brick imagery.
   m. Provide new lighting fixtures and associated conduits, wires and control devices.
   n. Provide new electrical panels.
   o. Provide new motor starters and disconnect switches.
   p. Provide new receptacles for water boxes.
   q. Provide associated conduits and wires for new cashier booths and fare lines.
   r. Security.
   s. Signage.
t. Electrical Work.
u. Mechanical/Plumbing Work.
v. Art in Transit.

4. Track area improvements:
a. Demolish suspended ceiling.
b. Structural repairs and concrete restoration.
c. Waterproofing.
d. Prep for painting. Refer to G002 for locations of identified lead paint.
e. Paint ceiling and columns.
f. Install new electrical conduits across track area.

A detailed description of the Work for each Prime Contractor is included in subsequent Paragraphs of this Section.

The General Contractor (GC) is the Coordinating Contractor (CC) for the duration of the Project.

1.02 RELATED SECTIONS

Section 01010: Summary of Work
Section 01041: Project Coordination
Section 15010: Basic Mechanical Requirements
Section 16010: Basic Electrical Requirements

1.03 ADMINISTRATIVE AND PROCEDURAL SECTIONS
(applicable to all contractors)

Agreement and Exhibit III scheduling requirements.

Section 01025: Measurement and Payment
Section 01060: Regulatory Requirements and Related Safety
Section 01066: Subway/Elevated Safety Requirements
Section 01300: Submittals
Section 01400: Quality Requirements
Section 01600: Material and Equipment
Section 01700: Contract Close Out

1.04 TEMPORARY FACILITIES AND SERVICES

Section 01500: Construction Facilities and Temporary Controls
Section 01505: Mobilization
Section 01510: Maintenance Support & Restoration of Existing Utility Facilities

Section 01530: Barriers and Enclosures

Section 01550: Site Access

Section 01570: Maintenance & Protection of Vehicles, Pedestrians & Passengers

Section 01580: Project Identification Signs and Other Construction Signage

Section 01590: SEPTA Field Office

1.05 GENERAL CONTRACTOR (GC)

A. The GC is responsible for compliance with Division 1 of the Specifications and has specific responsibilities:

Section 01050: Field Engineering

Section 01500: Construction Facilities and Temporary Controls

Section 01510: Maintenance Support and Restoration of Existing Utility Facilities

Section 01530: Barriers and Enclosures

Section 01550: Site Access

Section 01570: Maintenance and Protection of Vehicles, Pedestrians, and Passengers

Section 01580: Project Signs

Section 01590: SEPTA Field Office

B. The General Construction Contract includes architectural, civil and structural construction and other construction operations traditionally recognized as General Construction. The Work under the GC includes, but is not limited to the following:

1. Temporary facilities and services
2. Site preparation and demolition
3. Sitework
4. Selective demolition
5. Interior and exterior architectural finishes and amenities
6. Waterproofing
7. Structural Repairs and concrete restoration

C. General Contractor Work Summary: It is the intent of the general specifications and the accompanying general drawings that the General Contractor shall, unless otherwise specified herein, furnish all labor, materials, tools and equipment necessary to complete the work specified
herein. Work under the GC includes but is not limited to the following:

1. The GC is responsible for compliance with Division 1 of these specifications.

The General Construction contract also includes but not limited to:

2. The work described on the following drawings:
   a. G-Series, General Drawings.
   b. DC-Series, Civil Demolition Drawings.
   c. C-Series, Civil Drawings.
   d. DA-Series, Architectural Demolition Drawings.
   f. DS-Series, Structural Demolition Drawings.
   g. S-Series, Structural Drawings.

3. The work required by the following specifications:
   a. Division 2 – Site Work
   b. Division 3 – Concrete
   c. Division 4 – Masonry
   d. Division 5 – Metals
   e. Division 6 – Wood and Plastics
   f. Division 7 – Thermal & Moisture Protection
   g. Division 8 – Doors and Windows
   h. Division 9 – Finishes
   i. Division 10 – Specialties
   j. Division 12 – Furnishes

D. Repair of Damage

1. Conduct a complete inspection of the project site, station utilities and equipment, system drainage and street drainage, prior to the start of the work and notify SEPTA in writing regarding prevailing conditions. Repair and patch all damaged areas or other unsatisfactory conditions that develop during the course of the work which were not reported in writing to the Project Manager prior to the start of the work and not included as work of other prime contractors on site. Repairs shall match adjacent surfaces according to the applicable sections of these Specifications.

E. Pest Control: Engage an experienced exterminator to provide monthly treatment until the project closeout to rid project site within the contract limit of rodents, insects and other pests.

F. Maintenance: Provide the required maintenance for all equipment and materials installed under this contract in "like-new" condition until date of final payment.

1.06 MECHANICAL CONTRACTOR (MC)

A. The MC is responsible for compliance with Division 1 of the Specifications.

B. The Mechanical Construction Contract includes heating, ventilating, air-conditioning, plumbing and other construction operations traditionally recognized as Mechanical Construction. The Work under the MC includes,
but is not limited to the following:
1. Selective demolition.
2. Mechanical Construction including:
   a. Plumbing
   b. HVAC work
   c. Testing, adjusting and balancing
   d. Fire Protection / Clean Agent Systems

Description of Work
1. Flush existing stormwater drainage system.
2. Remove all plumbing fixtures in the toilet rooms, including the unit heaters.
3. Selective demolition of existing drain, body, piping, sleeve, and typical supports.
4. Install all plumbing fixtures in the toilet rooms, including the unit heaters.
5. Install new drain, body, piping, sleeve, cleanouts, and typical supports for stormwater conveyance system.
6. Furnish and install supply/exhaust fans including the duct distribution system, and grilles. See architectural details for grille configuration.

C. Mechanical Contractor Work Summary: It is the intent of the general specifications and the accompanying general drawings that the Mechanical Contractor shall, unless otherwise specified herein, furnish all labor, materials, tools and equipment necessary to complete the work specified herein. Work under the MC includes but is not limited to the following:

1. The MC is responsible for compliance with Division 1 of these specifications.

The Mechanical Construction contract also includes but not limited to:

2. The work described on the following drawings:
   a. G-Series, General Drawings.
   b. MP-Series, Mechanical/Plumbing Drawings.
   c. DM-Series, Mechanical Demolition Drawings.
   d. M-Series, Mechanical Drawings.
   e. DP-Series, Plumbing Demolition Drawings.
   f. P-Series, Plumbing Drawings.

3. The work required by the following specifications:
   a. Division 13 – Special Construction
   b. Division 15 – Mechanical
   c. All other associated specification sections pertaining to Work.

1.07 ELECTRICAL CONTRACTOR (EC)

A. The EC is responsible for compliance with Division 1 of the Specifications.

B. The Electrical Construction Contract includes lighting, power distribution, fire alarm system, communications, special systems, traffic signals, and other construction operations traditionally recognized as Electrical Construction. The Work under the EC includes, but is not limited to the following:
   1. Selective demolition.
   2. Electrical power distribution panels, disconnect switches and receptacles.
   3. Mechanical equipment power wiring and motor starters.
   4. Lighting system equipment, power and control wiring.
4. Telecommunication system equipment, power/signal distribution & wiring.
5. CCTV system equipment, power/data distribution and wiring.
6. AVPA system equipment, power/signal distribution & wiring.
7. Fiber Optic Multiplex Subsystem equipment, power/data distribution and wiring.
8. Fire alarm system equipment, power/signal distribution and wiring.
10. Technology systems equipment, power/signal distribution and wiring.
11. Pedestrian traffic signal relocation.
12. Street lighting.

C. Electrical Contractor Work Summary: It is the intent of the general specifications and the accompanying general drawings that the Electrical Contractor shall, unless otherwise specified herein, furnish all labor, materials, tools and equipment necessary to complete the work specified herein. Work under the EC includes but is not limited to the following:

1. The EC is responsible for compliance with Division 1 of these specifications.

The Electrical Construction contract also includes but not limited to:

2. The work described on the following drawings:
   a. G-Series, General Drawings.
   b. C-Series, Street Level Plans.
   c. DE-Series, Electrical Demolition Drawings.
   d. E-Series, Electrical Drawings.
   e. DEF-Series, Fire Alarm Demolition Drawings.
   f. EF-Series, Fire Alarm Drawings.
   g. DES-Series, Electronic Safety and Security Demolition Drawings.
   h. ES-Series, Electronic Safety and Security Drawings.
   i. DET-Series, Technology Demolition Drawings.
   j. ET-Series, Technology Drawings.

3. The work required by the following specifications:
   a. Division 3 – Concrete
   b. Division 13 – Special Construction
   c. Division 16 – Electrical
   d. All other associated specification sections pertaining to Work.

1.08 WORK BY SEPTA

A. SEPTA will install turnstiles, both in temporary locations and final locations in the fare line and will do the final wiring connections at the turnstiles.

PART 2 – PRODUCTS

--Not Used--

PART 3 – EXECUTION

--Not Used--

END OF SECTION 01011
PART 1 - SAFETY

1.01 DESCRIPTION

A. This Section specifies the safety & environmental requirements for contractor personnel involved in construction, maintenance, and rehabilitation projects on SEPTA property. The Contractor is required to assure that all employees, subcontractors, and suppliers/vendors, while on the Work site comply with the provisions of this Section.

B. At those facilities to remain in operation during construction, or are adjacent to SEPTA right or way, the Contractor shall take every precaution necessary to assure the safe access and egress of all SEPTA customers and employees, the safe and continuous operation of all SEPTA vehicles, ensure the appropriate protection of the environment as well as the safety and general welfare of the public at large. Depending on the configuration of the project, the contractor may be responsible for providing temporary pedestrian access including access which is accessible to those with disabilities. Under no circumstances is the contractor to block or restrict public or SEPTA entrances or the SEPTA vehicle right of way without prior written approval of the SEPTA Project Manager.

1.02 RELATED WORK

- Section 01010 Summary of Work
- Section 01041 Project Coordination
- Section 01066 Subway/Elevated Division Safety Requirements
- Section 01100 Special Project Procedures
- Section 01300 Submittals
- Section 01400 Quality Requirements
- Section 01500 Construction Facilities and Temporary Controls
- Section 01570 Maintenance and Protection of Vehicles, Pedestrian and Passengers
1.03 SUBMITTALS

The Contractor shall furnish a copy of the Contractor’s project/site specific safety plan (and corporate program if referenced) and protocols to the Project Manager within 30 days from receipt of the Notice to Proceed. The SEPTA Project Manager may prohibit and/or restrict any work on site until this plan has been received and approved.

If these specifications call for certification or licenses from the Commonwealth of Pennsylvania, it is understood that certification or licensure shall be from the state where the work is occurring and in the case of work in multiple states, then licensure from multiple states may be required.

1.04 QUALITY ASSURANCE

A. The Contractor shall be responsible for ensuring compliance with the regulations of all applicable occupational safety and health statutes and regulations of all of the applicable political jurisdictions where the work is being performed including those relating to the U.S. Department of Labor, FRA, FTA, and Occupational Safety and Health Administration (OSHA) standards. The Contractor shall conduct daily monitoring and document the compliance and performance of the requirements outlined in this document and those required by applicable governmental agencies. This documentation will be based on the applicable code requirements and shall be made available upon request of the SEPTA PM.

B. SEPTA Project Managers (SEPTA PM), Authority employees, and SEPTA’s third party consultant staff will monitor compliance with all applicable internal safety and environmental regulations and environmental contract specifications.

C. The Contractor’s employee safety program, which must be site specific, shall include but not be limited to the following (as applicable):

1) Work Site Orientation
   a. Safety and health hazards present in the work assignment and the general work area.
2) OSHA - written programs applicable to the scope of work.
3) Required training, licensing or certification, and documentation of same
4) Workers’ Compensation Reporting
5) Fall Protection equipment and requirements
6) Personal Protective Equipment
7) Confined Space Procedures
8) Hazardous Materials Handling and Disposal
9) Trenching and Excavation including shoring and sheeting
10) Cranes
11) Electrical Protection
12) Drug and Alcohol prohibitions and testing
13) Public, SEPTA Employee, and Passenger Protection
14) Site Emergency Procedures and Contact Information
   a. Emergency contact numbers
   b. Emergency escape routes and evacuation meeting place.
15) Nearest hospital including directions from the site with route maps

D. The Contractor shall provide a designated qualified safety officer who shall be responsible for all safety-related activities until the completion of the Work. The Contractor is also responsible for all safety related activities for all their subcontractors and suppliers working at the work site.

E. The safety officer shall report all on-the-job injuries at once to the SEPTA Project Manager and submit all paperwork about such injuries, within 24 hours or as required by the SEPTA PM.

F. The Contractor's safety officer shall, as a minimum hold weekly (tool box) safety meetings with all of the Contractor's personnel. Subjects, time, and location may be set at the Contractor's convenience. At least three (3) days before to each meeting, SEPTA requires an agenda be submitted to the SEPTA Project Manager, including the time and location of each meeting. Copies of signed attendance sheets and the meeting minutes shall be submitted to the Project Manager at each regularly-scheduled project coordination meeting.

G. The Contractor is required, by Agreement, to maintain an alcohol and drug-free environment. The Contractor shall describe in their employee safety program on how this contract stipulation is to be accomplished and maintained. Please note that SEPTA reserves the right to restrict access to its property, because of the inherent safety hazard to its employees and the general public. Any person shall be immediately removed and barred from SEPTA property if, in the opinion of SEPTA’s Project Manager, and/or other appropriate SEPTA representative, that person constitutes a safety risk.
1.05 TRACK SAFETY REQUIREMENTS

A. All Contractors performing work on SEPTA property will be required to comply with SEPTA’s Roadway Worker Protection Requirements (RWP) when the work to be performed has the probability of fouling the track. The required training may be obtained through scheduling with SEPTA’s Training Department.

1.06 GENERAL SAFETY REQUIREMENTS

A. The Contractor shall assume responsibility for overall site safety coordination and shall provide a full-time Project Safety Manager. The Project Safety Manager is required from the first day of the Contractor’s mobilization activities (including mobilization activities of the Contractor’s subcontractors).

1. A Contractor whose workforce, including all sub-contractors and vendors, exceeds fifty (50) workers at any time on the jobsite, are required to designate a safety person who is working on the site full-time and who sole duty is safety.

2. A Contractor whose workforce, including all sub-contractors and vendors, exceeds twenty-five (25) workers at any time on the jobsite, are required to designate a safety person who is working on the site full time and who’s collateral duty is safety.

3. If it is determined, by SEPTA and its Representatives that a Contractor or its Subcontractor’s work is considered a high hazard or extremely unusual, the subcontractor will designate a safety person who is working on the site full time and who sole duty is safety.

4. A high hazard activity is one that is determined to have the potential to result in a serious injury or death and may include (but not limited to) the following activities: crane lifts, unusual lifts, extensive scaffolding, demolition, excavation, fire or smoke generating activities, concrete formwork, pre-cast concrete, steel erection, shaft work, confined space, etc.

5. The prerequisites for a Project Safety Manager are:
   a. Minimum of five (5) years of experience in safety management for heavy/commercial construction.
b. Completed an OSHA 30 hour construction safety course within the last three (3) years.
c. Have the authorization to take prompt corrective measures.
d. If required, be recognized as the competent person in accordance with OSHA definitions.
f. Have the ability to recognize hazards associated with the scope of work.
g. Have a current First Aid & CPR certification.

A. The Contractor shall supply and furnish all required personal protective equipment (PPE) for their employees. The Contractor is also responsible for ensuring that PPE is worn correctly by all employees while on the work site. The Contractor’s employees shall wear compliant safety equipment including, but not limited to, hard hats, work shoes/boots, safety vests, safety glasses, and fully body cover clothing, including flame retardant (FR) clothing where and when it is required.

1. The minimum PPE standards must be met as outlined below:

a. Hard hats shall be ANSI-Z89.1 2003, Class E. Hard hats shall be worn at all times while on the work site.

b. Work shoes (ASTM 2413-11 C75 / I75) shall have non-slip soles. Permanent metal plates or cleats on the sole or heel of shoes are prohibited. Shoelaces are to be kept short, so they do not pose a tripping hazard. Athletic shoes, sandals, open-toed shoes, moccasins and/or shoes with heels higher than 1” are not permitted.

c. Contractor personnel shall wear eye protection at all times on the work site. Eye protection shall be safety glasses with rigid side shields that comply with ANSI Z-87.1. Prescription eyewear shall also meet the same requirements as described above, or the individual shall wear equivalent eye protection over their prescription glasses or contact lenses.

d. The safety vest shall be ANSI 107, Class 2 high-visibility with a yellow-green background and 2-inch retro-reflective striping for work on SEPTA owned property within any public right-of-way, where exposed to vehicular traffic, or otherwise required by rules.
or regulations. Work in Amtrak territory requires the use of an orange vest subject to approval by Amtrak.

e. The Contractor’s personnel shall wear long pants (without cuffs) and, at a minimum, short sleeve shirts. Sleeveless shirts are prohibited.

f. Approved hearing protection shall be worn in all designated areas identified by signs or when operating high noise level equipment. The contractor is responsible for providing acceptable hearing protection for their employees as outlined in OSHA 29 CFR 1910.95.

g. The Contractor is responsible for providing acceptable respiratory protection for their employees as outlined in OSHA 29 CFR 1926.103.

h. Gloves shall be worn where hand injuries are likely to occur based on the hazard present.

B. The Contractor shall take all necessary precautions and provide protective measures to prevent injury to the public and damage to property of others. To prevent unauthorized access to the work zone and storage areas, the Contractor shall furnish and erect construction fencing or barricades and signage, as specified in the contract documents or as directed by the SEPTA PM, for the safeguarding of the public against accident or damage before commencing operations. The Contractor shall maintain the protective measures and/or construction fencing in good condition as evaluated by the SEPTA PM, until removal.

C. The Contractor shall dismantle, remove and/or relocate construction fencing and barricades when directed by the SEPTA Project Manager.

D. The Contractor must ensure personnel, including subcontractors and vendors, receive the required SEPTA (and Amtrak or another railroad if applicable) Safety Training for the affected mode(s) before starting work. This covers the rules and procedures for personnel and equipment including but not limited to, working in or about stations, yards, tunnels, or adjacent to the track right-of-way. All personnel who are present at the job site at any time must have this training. All personnel are required to wear/display their
safety training card.

E. The Contractor is required to comply with OSHA’s Noise Standard 29 CFR 1910.95 and any local noise ordinances.

F. Where it is permitted to store materials on streets, the Contractor shall place such materials in a secure place in accordance with local jurisdictions so as to cause minimum obstruction to traffic and public safety. The Contractor shall not place materials within 15 feet of fire hydrants nor obstruct drainage gutters and inlets. The Contractor shall obtain and pay for all required permits about materials storage.

1. Material stored on site must be secured to prevent vandals from placing debris or material on the right-of-way. Material placed on the right of way must be removed by the contractor immediately upon notification, at any time, at no cost to SEPTA. At no time shall any merchandise, material, or other articles be permitted to remain piled or assembled on the ground or platforms adjacent to any track at a distance of fewer than ten feet, (10'-0") from the center line of such track.

2. Copies of Safety Data Sheets (SDS) and the quantity of each chemical must be provided to the SEPTA Project Manager for review and approval before chemicals can be brought to any SEPTA property. The SDS will be reviewed by SEPTA’s System Safety and Risk Management Department for approval.

3. All SDS must comply with OSHA’s Hazard Communication Standard 29 CFR 1910.1200. Also, all Contractors must be trained per the Hazard Communication Standard. The Contractor is responsible for maintaining all SDS used at the work site.

4. The storage of hazardous and flammable materials on SEPTA property is restricted, and permission for each material must be granted by the SEPTA Project Manager. When storing flammable and hazardous materials and hazardous waste, they must be stored in compliance with all applicable regulations. Flammable materials shall not be stored in confined spaces or other similar areas such as tunnels, underground rooms, and building basements.
5. If hazardous substances are present, such as wastes, or if the potential for a hazardous release exists, the Contractor is responsible for following their Site Safety Plan covering policies and procedures to protect workers and the public from the potential hazards.

R. Firearms or any items classified as concealed weapons will not be brought onto SEPTA’s property.

S. All tobacco use is prohibited within the construction project and all areas subject to restrictions by SEPTA or by local, state and federal law. Smoking within SEPTA indoor facilities is prohibited.

T. The Contractor may not block or obstruct access to emergency equipment such as first aid kits, AED units, eyewash stations, fire extinguishing equipment, fire hydrants, transformers, or emergency generators. Emergency equipment must not be disconnected or relocated by the Contractor without permission from SEPTA’s Project Manager.

U. All electronic devices must be turned OFF or placed in airplane mode when working within the fouling envelope of the right of way. If an individual must make a phone call, they must first step outside the fouling envelope of the right of way to make or receive the call or otherwise use an electronic device. The contractor and his personnel are liable for all fines assessed by the Federal and/or state regulators for a violation of this regulation. Violation of this regulation can result in the individual being prohibited from working on the project.

V. The use of headphones, ear buds, etc. are prohibited while in a construction area.

1.06 ACCIDENT AND INJURY REPORTING

A. The Contractor is responsible for reporting and investigating all work related accidents and incidents. This shall be completed promptly with recommendations for corrective actions to prevent similar accidents or incidents. Accidents and incidents include:

a. Personal Injury
b. Property Damage
c. Near Misses
d. Actual or potential exposure to toxic substances
   e. Hazardous material spills and releases
   f. Fires

B. The Contractor must notify the SEPTA Project Manager for all accidents and incidents that occur on SEPTA property immediately.

C. SEPTA reserve the right to conduct an independent investigation of all accidents and incidents that occur on the work site with the full cooperation of the contractor, subcontractor, and employees.

D. At accident locations where conditions are immediately dangerous to life and health, work shall be suspended until corrective actions are taken to the satisfaction of the appropriate SEPTA representative.

1.07 EMERGENCY PROCEDURES

A. The Contractor shall set up emergency procedures and prepare written guidelines discussing such procedures for the following categories:

1. Fire

2. Injury to contractor’s and/or SEPTA employees

3. Injury to general public

4. Property damage, including the property of utilities, i.e., gas, water, sewage, electrical, telephone or pedestrian and vehicle routes.

5. Hazardous/Toxic material spill, discharges and/or exposure.

6. Site evacuation

B. Copies of all guidelines for emergency procedures shall be written and posted before the initiation of actual construction. Posting shall include emergency telephone numbers and directions to and from the nearest hospital. The Contractor shall have standing arrangements for the transportation and hospital treatment of any employees who may be injured, are exposed to hazardous material, or who may become ill. These guidelines shall be included in the Contractor's written safety program and shall be submitted to SEPTA.
C. The Contractor shall provide a fully equipped first aid kit at the site. This kit will be made available to the SEPTA PM for their inspection and approval at any time.

D. The Contractor must discuss site emergency procedures at the beginning of the project, with the addition of a new worker to the site, and at least monthly with all personnel at tool box safety meetings. Any changes to the work site emergency procedures must be documented, and employees, vendors and the SEPTA Project Manager notified.

E. SEPTA operational emergencies will be handled by the senior SEPTA Operations personnel present. This individual, designated “The Incident Commander” is responsible for summoning the number of persons required by the situation and assignment of all recommended procedures.

1.08 PROTECTION OF SEPTA FACILITIES

A. The Contractor shall be cognizant of and bound by SEPTA’s safety rules and regulations specified herein and conduct operations in strict accordance with same.

B. SEPTA shall be the sole judge of protection necessary for the safe operation of its facilities. SEPTA reserve the right to alter this protection at any time.

C. SEPTA’s Facilities and/or Structures shall not be utilized by the Contractor for temporary scaffolding and/or support for the construction effort without permission. A Contractor may request SEPTA’s consideration for such action. The Contractor shall provide a detailed plan to utilize SEPTA’s Facilities and/or Structures. The plans will be submitted for SEPTA’s review and approval prior to the initiation of any work. SEPTA also reserves the right to have the drawings and supporting calculations sealed by a Professional Engineer registered in the Commonwealth of Pennsylvania, or appropriate jurisdiction, at no cost to SEPTA.

D. Before any work is done in the vicinity of an existing structure, SEPTA must be notified and may require a plan for stabilizing and underpinning the structure prepared and sealed by a Professional Engineer licensed in Pennsylvania, or appropriate jurisdiction, at no expense to SEPTA.
1.09 CRANE, MATERIAL HANDLING, AND ERECTION SAFETY

A. The Contractor shall take care to prevent any structure from being loaded with weight, for any duration, which will endanger its stability, or the safety of persons.

B. The contractor shall adhere to all Local, State, and Federal laws about crane operations.

C. All cranes must be inspected annually as well as monthly. The most recent reports shall be submitted to SEPTA prior to the use of the cranes on any work site. SEPTA’s Project Manager must ensure that daily safety inspections are completed. The monthly reports for the crane must be submitted to the SEPTA Project Manager on a pre-determined schedule as long as the crane is operating on the project.

D. The Contractor shall ensure all crane operators and riggers are trained and competent in the use of such equipment. The Contractor shall provide a competent person to oversee and/or perform lifting operations as required by OSHA. Personnel qualifications will be made available to SEPTA upon request.

E. The Contractor shall submit for review to the Project Manager, sketches defining the operations of all cranes, material handling equipment, and erection activities used in support of construction during periods of train operations. The Contractor shall submit, at the Project Manager’s request, similar information for cranes or other equipment in use and capable of encroachment.

1. These sketches shall include planned locations and movements of the equipment, calculations demonstrating the adequacy of the capacity of the crane for the loads, the interface between the footprint of the equipment the movement of the boom and loads relative to the existing structure and surrounding buildings, the support grillages and the protection of existing utilities and facilities, and any other pertinent details required by the Project Manager.

2. The following data shall be required for all hoisting operations adjacent to active SEPTA operations and facilities and shall be prepared by and sealed by a Professional Engineer licensed in Pennsylvania.
a. Plans and sections showing locations of cranes, horizontally and vertically, operating radii, with delivery of disposal locations shown. The location of the SEPTA Right of Way and all active facilities shall also be shown.

b. Crane rating sheets showing cranes to be adequate for 150% of the actual weight being lifted. A complete set of crane charts, including crane, counterweight, and boom nomenclature is to be submitted.

c. A location plan showing all obstructions such as wires, poles, adjacent structures, etc., and that the proposed lifts are clear of these obstructions.

d. A data sheet shall be prepared to list the type, size, and arrangements of slings, shackles, or other connecting equipment, all to be designed for 150% of the actual weight being lifted. Copies of a catalog or information sheets for specialized equipment shall be included.

e. A complete procedure is to be included, indicating the location and order of lifts and any repositioning or re-hitching of the crane or cranes.

f. Temporary support of any components or intermediate stages is to be shown and detailed.

g. A schedule of the various stages must be shown as well as a schedule for the entire lifting procedure.

F. Specialty slings and hooks shall not be used to set steel or move materials over workers. All sling and crane load line hooks shall have safety latches installed or shall be moused, except for specialty slings and hooks such as sorting or shake out slings or self-adjusting pipe slings.

G. The Contractor shall not leave suspended loads unattended. When moving loads, the operator shall ensure a clear path free of personnel or other barriers.
H. The Contractor shall establish a restricted work area using barricades and other appropriate controls to minimize the hazards to personnel, customers, and equipment from swinging or falling objects.

1.10 SNOW REMOVAL

A. The Contractor shall remove all snow and ice from the project site as required for the proper protection and prosecution of the Work, and protect SEPTA employees and the public. The Contractor shall be at all times provide and maintain adequate protection against weather so as to preserve all Work, materials, equipment, apparatus, and fixtures free from damage.

B. The Contractor shall not use sodium chloride (or any chloride) on any facilities adjacent to SEPTA electric rail lines where the possibility exists that melting mixture may leach onto the contact rail within the Right of Way.

1.11 WELDING, CUTTING AND OTHER HOT WORK

Gas or electric cutting, burning, or welding shall be done by the guidelines of NFPA 51B, the International Fire Code, federal, state, and local rules and regulations, or the provisions below, whichever is more restrictive.

A. If hot work is to be executed at a job site, the prime contractor’s safety officer must have a copy of the current version of NFPA 51B at the job site.

B. The prime contractor’s safety officer shall act as a Permit Authorizing Individual (PAI) and complete the checklist to fulfill the requirements of by 51 B for all torch work. The contractor shall obtain the current copy of SEPTA’s “Hot Work Checklist” for this purpose.

C. The SEPTA PM shall be notified at least 48 hours in advance of any hot work on site. A copy of each checklist completed for that period shall be delivered to the SEPTA PM at the next job progress meeting.

D. Spark shields and a fire watch must be posted when executing hot work and for at least four hours after all activity has been completed. The SEPTA PM reserves the right to extend the duration of the fire watch in special circumstances. A supply of water and an approved fire extinguisher shall be readily available to the location where the work was done.

E. All oxygen/acetylene bottles must be removed and stored outside of all
tunnels, underground stations and other confined spaces at the end of the workday. While in use in a tunnel, underground station or other confined space, they shall be attended at all times. At no times when not in use shall oxygen and acetylene bottles be stored together.

F. Anti-flashback devices must be installed on the fuel side of all gas and oxygen cutting torches.

1.12 GAS CYLINDERS

A. Compressed gas cylinders shall be handled and properly supported and secured in an upright position away from heat or flame sources. Cylinders that are not being used or being transported must have their caps in place.

B. Regulators, hoses, and torch assemblies must be in working order and checked for leaks prior to initial use or installation. If a leak is discovered, the cylinder must be removed to a safe location.

C. Cylinders must be labeled and stored according to compatibility with signs posted.

D. Oxygen and acetylene cylinders, empty or full, shall not be stored together. Full oxygen cylinders must be separated from acetylene cylinders or other fuel-gas cylinders or combustible materials a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.

E. All cylinder valves must be closed when cylinders are not in use and the hose pressure bled down.

F. All cylinders must be removed from confined spaces at the end of each work day.

1.13 UTILITIES

A. Before any excavation begins, the Contractor must determine the location of all utility installations such as but not limited to sewer lines, telephone lines, fuel lines, underground electric lines, water lines, or any other underground installations that may be present during excavations.
B. As per 73 P.S., § 176, et seq., the Contractor is required to notify utilities prior to all excavations. The Contractor shall be held responsible for any damage done to any utility in the prosecution of the Work. The Contractor shall exercise any precautions necessary to prevent damage in working underneath or adjacent to any underground structure. If it becomes necessary for a utility company, through emergency procedures or because of unforeseen conditions, to repair, reconstruct, relay or relocate utilities within the contract area, after work has commenced by the Contractor, then the said utility company and the Contractor shall make suitable arrangements to overcome such interference. All work shall be accomplished at no extra cost or charge to SEPTA. No compensation shall be allowed the Contractor for the disruption to his work. A no-cost time extension may be granted in accordance with the Contract to the Contractor by SEPTA for the delay that has occurred.

1.14 HOUSEKEEPING

A. The Contractor shall maintain the work area in an orderly manner.

B. The Contractor shall provide containers for trash and scrap metal unless prearranged with the SEPTA Project Manager before the start of the project.

C. The Contractor is responsible for the proper disposal of hazardous, flammable, trash, and/or excess waste material. All waste must be removed or secured on site daily. See SEPTA’s Contractor Environmental Safety Requirements for more information on hazardous waste.

D. The Contractor is responsible for maintaining all disposal records, including chain of custody records for hazardous or untested material, and providing copies to the SEPTA Project Manager where applicable.

E. No on-site burning or burying of waste or material is permitted.

1.15 ELECTRICAL

A. The Contractor directly involved with electrical work, or work adjacent to electrical hazards shall do so only after details of the work has been planned and approved by SEPTA.

B. All electrical work shall comply with OSHA 29 CFR 1926.400 (Electrical
Standard), OSHA 29 CFR 1910.147 (Lockout/Tagout), The National Electric Code (NEC), NFPA 70E (latest editions), and any SEPTA standards.

C. All equipment and cords must be free from damage. Frayed or cut electrical cords, or cords with damaged plugs or missing ground plugs shall immediately be removed from service, rendered unusable, and removed from the work site.

D. All electrical tools and equipment must be grounded.

E. Before working on a de-energized circuit, it must be electrically tested to ensure it is de-energized.

F. The Contractor must complete lockout/tagout procedures for all machines, equipment, and systems that require service or maintenance as required by 29 CFR 1910.147.
   1. A lock or tag can only be removed by the individual or their designee.

G. After the Contractor performs repairs, maintenance or installations, and before SEPTA employees attempt to re-energize the electrical equipment, verification shall be performed in the presence of the SEPTA PM to ensure that the electrical equipment components are operationally intact and that no electrical hazard is present upon re-energizing.

1.16 CONFINED SPACE

A. The Contractor shall be required to have competent and trained personnel for restricted or confined space entry work.

B. All confined spaces at SEPTA are permit required spaces and the Contractor is required to utilize SEPTA’s confined space permit.

C. Confined spaces refer to space which by design has limited openings for entry and exit but large enough to enter to perform work, the potential for toxic atmosphere or one that can produce a toxic atmosphere, and is not designed for continuous occupancy. Confined spaces at SEPTA can include, but not limited to, storage tanks, boilers, trenches, manholes, lift stations, and valve pits.
D. The Contractor shall coordinate and obtain approval from the SEPTA Project Manager for all confined and restricted space activities.

E. The Contractor must provide emergency rescue based on the work being conducted. Documentation on the rescue procedures, authorized rescuers, training and equipment must be approved by SEPTA and be available on site prior to conducting confined space entries.

1.17 EXCAVATION AND TRENCHES

A. The Contractor shall provide training to all personnel required for safe trenching and excavation projects on SEPTA property and comply with OSHA Excavation Standard 29 CFR 1926 Subpart P.

B. Before any excavations or trenching, the Contractor shall be responsible for utility marking to ensure the area impacted is free from underground hazards.

C. Excavations and trenches over 4-feet must have appropriate protective systems such as but not limited to sloping, trench shields, and shoring, if soil conditions are unstable excavations less than 4 feet must have protection. This requirement is in addition to any other regulatory requirements including OSHA requirements.

D. Daily inspections of excavations, adjacent areas, and protective systems must be made by the Contractor to ensure safety systems are functional and effective.

E. The Contractor shall place warning signage and barricades or fencing to prevent unauthorized or accidental access to the site.

F. The Contractor shall cease work immediately and contact the SEPTA Project Manager if a suspect material such as strong odors, discolored soils, pipes, pipe covering or another material indicating the potential presence of asbestos, or other hazardous materials is encountered.
1.18 LADDER SAFETY

A. All ladders and their use must comply with OSHA 29 CFR 1926.1053 and ANSI specifications.

B. Metal or other conductive ladders are prohibited.

C. Ladders must be inspected before use and must be in good condition and free of any broken or defective parts. Defective ladders must be removed from service.

D. The Contractor must provide training to all employees using ladders in their proper use, how to recognize ladder hazards and how to correct identified safety hazards.

E. Job fabricated ladders are prohibited.

1.19 FALL PROTECTION

A. The Contractor shall provide fall protection and proper training for its employees, as required by 29 CFR 1926.500. Fall protection is required in areas where the fall hazard is 6 feet or greater from the lower working level or surface. This includes scaffold use, erection/dismantling. Steel erection will follow OSHA Subpart R 1926.760 (a) (3)

B. If compliance with the six-foot rule is technologically and/or physically infeasible, a preplanning meeting must be scheduled with SEPTA’s Representative as required, to determine alternatives.

C. A site-specific fall protection plan should be developed by the Contractor for each high-risk phase of work. Plans should include a list of anticipated exposures and anticipated protective systems for each phase of construction.

D. The Contractor and each subcontractor are ultimately responsible for fall protection for their employees. Fall Protection should be included in each subcontractor’s safety program. A site specific fall protection plan should be developed by each subcontractor for the exposures they will encounter on each job site.

E. Pre-planning is required for all high-risk activities.
F. This section does not include work from ladders. (Refer to OSHA 1926, Subpart X).

G. Contractors whose work will require them to be exposed to fall hazards beyond conventional guardrail systems are to submit a Site Specific Fall Protection Plan before the start of their work, which will specify the location of anchorage points and anticipated exposures.

H. Warning Line Systems:
   1. In addition to Subpart M-Fall Protection, the warning lines typically used for roofing work and controlled access zones, and other areas covered by OSHA Letters of Interpretation (as defined under 1926.500) shall be permitted under the following criteria:

   (a) All lines shall be placed a minimum of fifteen (15) from all exposed edges.
   (b) Lines shall meet or exceed the requirements in §1926.502(f)(2).
   (c) Fall protection signage shall be placed along the warning line at intervals appropriate for the conditions.
   (d) For controlled access zones, the warning line shall be connected on each side to a guardrail system. The guardrail system shall project fifteen (15) feet beyond the warning line connection point.
   (e) Points of access are not permitted from unguarded edges into the area(s) defined by a warning line unless the access points are protected by conventional fall protection.
   (f) Conventional fall protection shall be used by all personnel working between the warning line and the exposed edge(s).
   (g) The employer effectively implements a work rule prohibiting the employees from going past the warning line unless protected by conventional fall protection.

I. The Contractor shall maintain and upon request, submit to the SEPTA representative, all Fall Protection Training Documentation as specified by OSHA.

   1. Fall protection training certification for each employee is to be submitted by the subcontractor which includes the name of the employee, the signature of the trainer and the date of the training.
2. If the employer relies on training conducted by another employer, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of the actual training.

J. For dedicated/designated Loading Zones which require the removal of any type of fall protection (wooden or cable guardrail systems, windows, and wall panels, etc.):

1. The immediate area near the loading zone must have a hard barricade in place that meets the requirements of a standard guardrail system to prevent other trades working in the area and/or on that floor from being exposed to a fall hazard.

2. Removal of any fall protection, such as guardrail system, must be replaced with approved personal fall protection.

3. Workers in loading zones shall be required to use a full body harness that they continue to wear and remain hooked until they are on the inside of the guardrail system which provides protection from a fall.

4. Temporary loading zones may use temporary barriers which restrict the access of workers not engaged in that loading activity. At a minimum, Red Danger Tape may be used set back at least 15 feet from the opening temporarily.

5. A 4”x 6” toe board may be required when the possibility exists for motorized equipment to be driven off the edge.

6. Loading zones are to have the ability to be locked and controlled by the Contractor.

K. A Guardrail Disruption Policy and supporting permits shall be developed, implemented and enforced per site requirements.

L. Controlled Access Zone work requires pre-approval. Request for approval must be submitted with a site-specific fall protection plan, infeasibility statement for each location, and training for each employee. A review of the submitted documentation will be done by the SEPTA’s Representative.
M. The use of field designed and field fabricated horizontal life lines systems must be designed and installed under the supervision of a qualified person. Proof of such design and proper installation must be furnished upon request. The system shall be certified as a whole system, not just the capacities of its parts.

N. The use of Pre-Engineered/Pre-Manufactured horizontal lifelines systems must be installed and used in accordance with manufacturers instructions. Design data and written verification of proper installation must be furnished upon request.

O. The Contractor shall isolate work areas to protect persons from falling objects and to prevent unauthorized access to the work site.

P. The Contractor shall perform documented inspections of their fall protection equipment before each use.

Q. Work being conducted within six feet of a floor opening (skylight, hole, open hatch, etc.) requires the appropriate fall protection.

R. Work being conducted on a roof within six feet of the edge requires the appropriate fall protection. The Contractor shall not work on or access roofs without prior approval from SEPTA Project Manager.

1.20 SCAFFOLDS

A. All scaffolding, staging, and work platforms must satisfy OSHA 29 CFR 1926.450 and the manufacturer’s requirements.

B. The Contractor shall ensure that scaffolding be erected and inspected by trained personnel.

C. The Contractor shall perform documented pre-use inspections for erected scaffolding.

1.21 POWERED EQUIPMENT/WORK PLATFORMS

A. The Contractor shall not use SEPTA owned or leased powered equipment or aerial work platforms unless approved by the SEPTA Project Manager.
B. The Contractor shall ensure only trained and authorized personnel to operate any powered equipment such as but not limited to forklifts, extendable boom lift, scissor lifts, and cranes.

C. The Contractor shall perform documented inspections of equipment before each day’s use to ensure safe operating condition. Defective equipment must be segregated and not be used on the work site.

D. The Contractor must ensure all its employees and subcontractors have had appropriate and effective training in compliance with OSHA 29 CFR 1910.178 (Powered Industrial Vehicles) and 29 CFR 1926.453 (Aerial Lifts) and the manufacturer’s recommendations.

1.22 FIRE SAFETY

A. The Contractor’s personnel should be familiar with the location of fire alarm pull stations, portable fire extinguishers and exit routes from the work area. The Contractor shall not obstruct access to exits, exit routes, or fire equipment or prop-open stairwell doors.

B. Fires shall be reported by activating the nearest fire alarm station and calling 911.

C. The Contractor’s personnel shall be trained in the proper use of a portable fire extinguisher in the event fire watch duties are required.

D. Flammable and combustible materials at a minimum must be labeled, properly stored, and disposed. Please see the Contractor Environmental Requirements.

E. The Contractor must follow requirements listed in the “Welding, Cutting and Other Hot Work” section of this document, if welding, torch cutting, soldering or other forms of “hot work” will be performed.

F. The Contractor must take precautions to prevent damage to fire protection systems. All damage must be reported immediately to the SEPTA Project Manager.

G. The Contractor must not disable a fire protection system (sprinklers, fire alarm system components, etc.) unless prior approval has been provided by
the SEPTA Project Manager and local fire department. If a system is disabled, fire watch personnel must be present until that system is reconnected or other arrangements have been made and approved by the SEPTA PM.

H. Materials or equipment must not be temporarily or permanently suspended on sprinkler pipes, valves, or supports.

1.23 PROTECTION OF EXISTING WATER AND SEWER LINES

A. When the equipment axle load exceeds 15 tons, the Contractor shall provide and work from timber mats placed over existing underground water lines and sewer lines.

B. SEPTA reserves the right to require additional protection and/or protection plans sealed by a professional engineer.

PART 2 - ENVIRONMENTAL

2.01 SUBMITTALS

A. The Contractor shall furnish for review by SEPTA the Contractor's Environmental and/or Waste Management Program within thirty (30) days from receipt of the Notice to Proceed (see Section 2.04.B).

B. Prior to the start of work, Contractor shall furnish for review by SEPTA a Means and Methods Plan describing the day-to-day activities the contractor will employ to complete construction in accordance with the specification requirements. The Means and Methods Plan shall include the following:

1. A detailed, stepwise description of the construction process organized sequentially;

2. A description of any specialized equipment to be utilized to complete the work;

3. Identification of potential hazards in the construction process; and

4. A description of the construction mitigation measures that the contractor will implement to mitigate identified hazards.
C. Prior to the start of work, Contractor shall furnish for review by SEPTA a copy of asbestos and lead survey findings/reports. If asbestos abatement or lead removal is conducted, Contractor shall further furnish to SEPTA prior to the start of those activities, all relevant submittals including but not limited to notifications, work plans, and health and safety plans. Within thirty [30] days of completion of work, waste disposal records documenting disposal at a SEPTA-approved facility shall also be submitted to SEPTA (see Section 2.07.H).

2.02 QUALITY ASSURANCE

A. The Contractor shall daily monitor and document the compliance and performance of the requirements outlined in this Section consistent with appropriate SEPTA Work rules and Federal, Commonwealth of Pennsylvania, and Local rules and regulations. The Contractor shall document the Contractor's compliance with applicable codes and regulations.

B. The Contractor's Environmental and/or Waste Management Program, as a minimum, shall include but not be limited to the following as applicable to the Work:

1. Sustainability and Recycling

2. Waste Management and Disposal

3. Hazardous Materials

4. Soils Management

5. Erosion and Sedimentation Control

6. Noise Control (if applicable)

C. The Contractor shall provide a qualified environmental safety officer who shall be responsible for all environmental safety-related activities until the completion of the Work. The environmental safety officer shall report all on-the-job environmental incidents at once to the Project Manager and submit all paperwork about such incidents as required.
2.03 EMERGENCY PROCEDURES

A. The Contractor’s Project Manager (or equivalent) and Project Safety Manager shall conduct a pre-mobilization meeting with SEPTA and SEPTA Representatives to determine and review site-specific emergency action requirements.

1. Identify emergency contacts between the Contractor, SEPTA and SEPTA Representatives with exchange of phone numbers, beepers, etc. and establish primary means of communication with owner; i.e., radio, Nextel, telephone, etc.

2. Evaluate the impact and then develop plans for pedestrian and vehicular traffic on campus or community.

3. Prepare written guidelines discussing response and notification actions related to hazardous/toxic material spills, discharges, or releases. Such guidelines shall be incorporated into one more Contractor’s required site-specific plan submittals, such as the Health and Safety Plan, Work Plan, Contingency Plan, or Environmental/Waste Management Program.

4. Address other issues as required.

5. Contact and meet with local fire department and rescue team.

6. Develop site-specific emergency action plan which is to address, at a minimum, the following elements:

   a. Emergency Escape Procedures and Escape Routes
   b. Procedures to be followed by employees who remain to operate critical functions before they evacuate the jobsite
   c. Employee Emergency Evacuation Meeting Point
   d. Rescue and Medical Duties of Personnel
   e. Emergency Reporting Procedures
   f. Emergency Radio Procedures
   g. Alarm System
   h. Severe Weather Alert
2.04 STORAGE AND HANDLING OF MATERIALS

A. Materials Handling:

1. All scrap material of any kind, type, or nature shall be placed into designated confined areas or containers specifically supplied for this purpose. Containers shall be removed from the job site when full.

2. The Contractor shall assure that all chemicals, paints, solvents, and cleaners are maintained per OSHA's hazard standards. Discarded chemicals shall be disposed of in accordance with applicable Commonwealth of Pennsylvania Department of Environmental Protection (PaDEP) and/or Environmental Protection Agency (EPA) requirements. Copies of all Material Safety Data Sheets (MSDS), OSHA Form 20, and the Product Use sheets shall be given to SEPTA's Project Manager before or at the time of material delivery. All training shall be done in accordance with OSHA's Hazard Communication Standard.

3. Materials handling shall be conducted in accordance with the Contractor’s Environmental / Waste Management Program (see Section 2.04).

2.05 ENVIRONMENTAL PROTECTION

A. Environmental protection considerations consist of, but are not limited to, the following factors:

1. Natural resources, including air, water, and land.

2. Solid Waste disposal.


4. Control of toxic substances, hazardous materials, and radiation.

5. The presence of chemical, physical, and biological elements and agents that adversely affect and alter ecological balances.

6. Degradation of the aesthetic use of the environment.
7. Historical, archaeological, and cultural resources.

B. General Requirements:

1. The Contractor shall provide and maintain environmental protection as defined herein or as required by regulation, whichever is more restrictive.

2. The Contractor's operation shall comply with all applicable Federal, Commonwealth and Local laws, ordinances, and regulations pertaining to environmental protection.

3. Compliance of subcontractors and suppliers with the provisions of this and all other sections of these Specifications shall be the responsibility of the Contractor.

4. The Contractor shall not use equipment from which factory-installed antipollution and noise control devices have been removed, altered or rendered ineffective intentionally or through lack of proper maintenance.

5. Unless the Contractor has tested and established the safety of existing paints and coverings, he shall provide adequate pollution controls for painting and surface preparation in compliance with the PaDEP Regulations.

C. Protection of Natural Resources:

1. General
   a. It is intended that the natural resources within the project boundaries and outside the limits of permanent Work performed shall be preserved in their existing condition or be restored to an equivalent of the existing condition, as approved by the Project Manager upon completion of the Work. The Contractor shall confine its on-site construction activities to areas defined by the Contract Drawings and Specifications or as directed by the Project Manager.

2. Protection of Project Site and Existing Roadways:
   a. Debris or rubbish of any kind shall not be dumped onto the site or roadways. This shall include paint splatters, cleaning, stripping and surface preparation chemicals and spillage during painting operations.
Care shall be taken to prevent damage and injury to personnel, vessels, and vehicles using roadways, or areas accessible to pedestrians. Devices shall be provided and maintained by the Contractor as required to prevent such occurrences. Material or items falling onto roadways shall be promptly removed at the Contractor's expense. All damage to third party property shall be restored by the contractor to the owner's satisfaction at no cost to SEPTA.

b. The operator shall remove from the site, recycle, or dispose of all building materials and wastes in accordance with the PaDEP solid waste management regulations at 25 pa code 260.1 et seq., 271.1 et seq. The contractor shall not illegally bury, dump, or discharge any building material or wastes at this site.

3. Land Resources:

a. Except in areas indicated to be cleared or excavated, the Contractor shall not remove, cut, deface, injure, or destroy trees, shrubs, or vegetation. No ropes, cables, or guys shall be fastened or attached to any existing nearby trees for anchorage unless specifically permitted by the Project Manager. Where such use is permitted, the Contractor shall be responsible for any resulting damage.

b. The use of pesticides or herbicides is not permitted unless approved in writing by the SEPTA PM.

c. The Contractor shall submit a plan for protecting existing trees and vegetation that are to remain and that may be injured, bruised, defaced, or otherwise damaged by construction operations. Rocks that are displaced into uncleared areas shall be removed. Monuments, markers, and works of art shall be protected prior to the start of the operations. A preconstruction survey, including photographs, shall be performed by the Contractor in the presence of the SEPTA PM, and a written report of the survey shall be furnished to SEPTA within five (5) days of its request by the Project Manager.

d. Repair and Restoration: All trees, vegetation, and other man-made or natural landscape features that are to remain and become
scarred or damaged by the Contractor’s equipment or operations shall be repaired and restored to their original condition at the Contractor’s expense. The Project Manager shall approve the repair and restoration program prior to its initiation and after completion.

4. Water Resources: At all times, measures shall be taken to prevent oil, gasoline and other hazardous substances and pollutants from entering the ground, drainage areas, sewers, streams, and other local bodies of water.

5. Wildlife Resources: The Contractor shall not disturb native habitat adjacent to the construction project area.

D. Erosion and Sediment Controls:

1. Site burning of any kind, including ground vegetation, is not permitted.

2. The Contractor shall conform to all applicable requirements of the PaDEP and the County with on erosion and sediment control measures to prevent discharge into stormwater discharge systems and active waterways.

E. Toxic Substances:

1. The Contractor shall comply with the Toxic Substance Control Act, P.L. 94-469 (TSCA).

   a. No toxic chemical substance, mixture, equipment, container, sealant, coating, or dust-control agent shall be used except in accordance with all provisions of the TSCA as interpreted by the rules and regulations of 40 CFR 761.

   b. Any toxic chemical substance, mixture, equipment, container, sealant, coating, or dust-control agent found stored within the project area shall be immediately reported to the Project Manager in writing and work shall be stopped in the area. The Project Manager shall make arrangements for the removal of the toxic materials, will ensure that the area is safe for the Contractor to continue work in the area.
F. Control and Disposal of Chemical and Sanitary Wastes:

1. Trash shall be picked up and placed in containers that shall be emptied on a regular schedule. Handling and disposal shall be so conducted as to prevent contamination of the site and other areas, and shall not be disposed of in wetlands or burned on the right-of-way. On completion, the area shall be left clean and in natural condition.

2. Disposal of rubbish and debris shall be as follows: The Contractor shall transport all waste, including excess excavated material, from the site and dispose of it in a manner that complies with the Federal, Commonwealth of Pennsylvania, and Local requirements. The Contractor shall secure a permit or license prior to transporting any material off the site. Waste materials shall not be burned on the site. The Contractor shall be responsible for the disposal of waste material to a pickup point or disposal area.

4. Chemical waste shall be stored in corrosion-resistant containers, removed from the project site, and disposed of as necessary, as but not less frequently as monthly. Disposal of chemical waste shall be in accordance with standard established practices as approved by the Project Manager. Fueling and lubricating of equipment and motor vehicles on the site shall be conducted in a manner that affords the maximum protection against spills and evaporation. Lubricants to be discarded, including burned oil, shall be disposed of in accordance with approved procedures meeting Federal, Commonwealth of Pennsylvania, and Local regulations. For oil and hazardous material spills that may violate Federal, Commonwealth of Pennsylvania, or Local regulations, the Project Manager shall be notified immediately.

G. Dust Control:

1. Airborne dust shall be minimized at all times, including non-Working hours, weekends, and holidays. Soil at the site, station platforms, haul roads, and other areas disturbed by the Contractor's operations and materials stockpiled for the project shall be treated with dust suppressors or covered to control dust. Dry power brooming shall not be permitted. Vacuuming, wet mopping, wet sweeping, or wet power brooming shall be used instead. Air blowing shall be permitted only for cleaning off non-particle debris, such as that from reinforcing bars. Sandblasting shall not
be permitted except as otherwise specified elsewhere. Only wet cutting of concrete block, concrete, and asphalt shall be permitted.

2. The Contractor shall comply with all applicable provisions of the National Emission Standards (40 CFR 61).

3. The Contractor shall inspect all vehicles for dirt prior to their leaving the construction site. Dirt, soil, and rubble likely to be dislodged during transit shall be removed from the trucks and other vehicles prior to leaving the site.

4. The Contractor shall ensure that equipment transporting material to and from the site that may become airborne is covered.

5. The Contractor shall not cause or permit fugitive particulate matter to be emitted into the outdoor atmosphere from any source such that emissions are visible beyond the project property line.

H. Noise Control:

1. The Contractor shall research and determine the applicable jurisdiction requirements for noise control in the project area. In the event, a project site lies in two or more jurisdictional areas and the requirements conflict, the strictest will govern. City of Philadelphia Air Management regulations governs for any work within Philadelphia. In absence of specific jurisdictional instructions regarding noise control, OSHA 29 CFR §1910 will apply.

I. Asbestos and Lead Containing Materials

1. Prior to the commencement to work, Contractor shall coordinate performance of a survey of the project area for asbestos containing materials and lead-based paint by asbestos and lead inspectors/investigators properly licensed and certified to perform such work in Pennsylvania (and the City of Philadelphia where applicable). Contractor shall submit to the SEPTA Project Manager with a copy of the findings/report (see Section 2.03.C). Given the age of many SEPTA properties it is always possible to encounter suspicious material.

3. All asbestos abatements shall be conducted by licensed abatement Workers and Supervisors and air monitoring shall be conducted by the third party licensed Building Inspector and/or Asbestos Project Inspector (depending on location as determined by System Safety) and the specification shall be written by a licensed Asbestos Project Designer.

4. All submittals including but not limited to notifications, work plans, and health and safety plans shall be submitted to SEPTA for review prior to the commencement of work. Within thirty [30] days of completion of work, waste disposal records documenting disposal at a SEPTA-approved facility shall also be submitted to SEPTA (see Section 2.03.C).

5. All newly installed materials shall be asbestos and lead-free.

PART 3 – EXECUTION

3.01 SEPTA PROJECT MANAGER

A. Should it be necessary for SEPTA and its Representatives to take remedial steps in safety to assure a safe project environment for the General Public as well as workers at the SEPTA Project site, all remedial work shall be performed in a manner that does not to interfere with normal operations. All costs related to interruption of normal operations or construction activities shall be "back charged" to the responsible contractor. All "back charges" shall include the actual cost of labor and materials plus 20% for administrative costs. These costs shall include but not be limited to:

   a. The cost of the labor involved in the work, shop steward, foreperson, support crafts, contractor supervision, Project Management and SEPTA Management.
B. SEPTA and its Representatives shall have full authority to stop work in progress whenever necessary to enforce project safety requirements. No part of the time lost due to any such stop-work order shall be made the subject of a claim for extension of time or increased costs by the Contractor or subcontractors.

C. In the event the project site or any portion of the project site is stopped or shut down by any outside agency because of an unsafe condition, the responsible contractor shall bear the total expense for the project or that part of the project that is shut down. Said costs shall be for the entire period the project is stopped or shut down.

D. The Contractor shall not receive additional payment or reimbursement for safety items and procedures which have been identified as required by the Project Safety Requirements.

E. SEPTA and its Representatives shall have full authority to withhold full or partial progress payments for failure to comply with the Project Safety Requirements.

F. SEPTA and its Representatives shall have authority to discipline (including termination) any contractor employee for failure to comply with the Project Safety Requirements.

G. The SEPTA reserves the right to terminate this contract for failure to comply with the Project Safety Requirements.

H. In the event of conflict and/or ambiguity between various safety statutes or requirements, the interpretation by SEPTA and its Representatives as to which provision applies or what is implied in a given provision shall be final.

5.01 EMERGENCY CONTACT FLOW CHART

A. In the event of an emergency the contractor shall follow the attached flow chart.

B. In the event of an unforeseen change or incident that has or may affect the operation of revenue or non-revenue services the attached flow chart shall be followed.
C. Should an event cause damages or have the potential to cause damages to SEPTA or any other property on or near SEPTA property the flow chart shall be used.
PART 1 - GENERAL

1.01 SUMMARY

A. The Contractor(s) shall establish and maintain a project specific Quality Assurance/Quality Control (QA/QC) system in the form of an Inspection and Test Plan (ITPs) for the work executed under the Contract Documents.

B. Each Prime Contractor shall have the "primary" responsibility for the quality of all of its work as well as the work of its subcontractors and fabricators. The program shall include organization, personnel, procedures, instructions and records/documentation to properly maintain the quality of the Work.

C. Inspection and test plans shall be based on the requirements of each technical specification and shall include reference to the attribute(s) of the item(s) to be tested and/or inspected, the frequency (as applicable), the person or organization responsible for the activity and the method of documentation, if required. The Contractor(s) shall monitor implementation of ITPs to the extent necessary to control the quality of the work.

D. The primary responsibility for quality during construction remains with Each Prime Contractor and he must take all steps necessary to control the quality of the completed project.

E. Each Prime Contractor will cooperate fully with SEPTA’s QA/QC efforts including, but not limited to, providing requested information in a timely fashion when SEPTA executes quality audits of the project.

F. Each Prime Contractor will be responsible for completing the checklists and activities called for in SEPTA’s Construction Inspection/ Monitoring Program as part of their Quality Control program.

1.02 RELATED WORK

A. Agreement

B. Section 01300: Submittals

C. Section 01410: Testing and Inspection Services

D. Section 01700: Contract Closeout
1.03 SUBMITTALS

A. Each Prime Contractor shall develop and document an inspection and test plans (ITPs) and procedures for all elements of the Work. ITPs shall be based on the requirements of each section of the technical specifications and demonstrate how the quality of materials and workmanship required by the contract documents.

B. ITPs shall address inspection and test activities at the both the source of manufacture, at receipt at the project site and during installation. The complete set of ITPs for the project and any additional material required by the SEPTA PM to demonstrate the Contractor's QA/QC activities will constitute the Contractor's Quality Control Plan (QCP) for the Work. This QCP shall be submitted within fifteen (15) working days of the NTP.

C. SEPTA's review of a Contractor's QA/QC Plan shall not relieve the Contractor from adding subsequent testing as needed to meet its primary responsibility for the quality of the work.

D. SEPTA reserves the right to require mock-ups of any material and/or assembly, at any time during the construction process of a size proscribed by the SEPTA PM. Once approved, the mock-up will set a minimum standard of performance and/or appearance for the work. Mock-ups will be provided at no cost to SEPTA. The approved mock-up may, at the discretion of the SEPTA Project Manager, become part of the work.

1.04 QUALITY DEFINITIONS AND RESPONSIBILITIES

A. The following definitions pertain to requirements of this section.

1. Quality Assurance (QA): QA is a program of policies, procedures and outline of detailed responsibilities to provide adequate confidence through approved surveillance and audit requirements that the Contractor will meet the highest quality standards.

2. Quality Control (QC): Quality Control is the act of examining, witnessing, inspecting, checking and testing of in-process or completed work to determine conformity with specified requirements and documenting the results.

3. Calibration: Comparison of two instruments or measuring devices, one of which is of known accuracy traceable to national standards, to detect, correlate, report or eliminate by adjustment any discrepancy in the accuracy of the instrument or measuring device being compared with the standard.

4. Inspection: A phase of Quality Control, which by means of
examination, observation, or measurement, determines the conformance of materials, supplies, components, parts, appurtenances, systems, processes, installation, or structures to predetermined quality requirements.

5. Source Inspection: Source inspection consists of review, monitoring, observation, and/or inspection, random or consistent, or at selected stages of manufacture or construction, of manufacturer or sub-manufacturer's personnel, material, equipment, processes, or tests.

6. Site Inspection: Site Inspection consists of reviewing, monitoring, observing and inspecting the Work at the project site.

B. Quality Manager

1. The Contractor shall identify a Quality Manager (QM) within its organization at the site of the Work, who shall be responsible for overall management of contract Quality Control matters. The QM shall be experienced in the performance and supervision of the inspections and tests required by the specification.

2. The responsibilities of the QM may be executed by the superintendent. SEPTA reserves the right to demand a separate full time QM who reports directly to the construction company director, at any time during the duration of the contract without cause.

3. The QM shall be on the work site at all times with complete authority to take any action necessary to ensure conformance with the Contract and obtain the level of quality defined by code and the contract documents. The QM shall be appointed and substituted by letter.

1.05 SOURCE QUALITY ASSURANCE ISSUES TO BE ADDRESSED BY THE CONTRACTOR

A. Engage subcontractors and suppliers who are thoroughly trained, experienced and familiar with the specific requirements and methods needed for the proper performance of the Work.

B. Take steps to investigate the authenticity of manufactured components and ensure that counterfeit components are not being used in the work.

C. Establish technical and administrative surveillance methods to ensure the highest degree of quality, and to correct potential problems if and, as they occur so as not to affect the Contract schedule.

D. Verify that the required quality control inspection, testing and
documentation activities have been performed and that the equipment, materials and assemblies comply in all respect to the requirements of the Contract Documents.

E. Take corrective actions in a timely manner to identify conditions adversely affecting the quality of Work.

F. Verify the use of appropriately scaled and calibrated measuring and test equipment to perform inspections and tests. Calibration records shall be traceable to national standards and shall reflect the as-found condition of the equipment at the point of calibration. Verify that all equipment has been calibrated at a frequency acceptable to SEPTA and inspect logs of these calibration efforts.

G. All test results shall clearly include a statement that the item tested or analyzed conforms, or fails to conform, to the contract requirements. Each report shall be conspicuously stamped on the cover sheet in large red letters a minimum of ½ inch high "CONFORMS" or "DOES NOT CONFORM" to the contract documents as the case may be.

H. All test reports shall be signed by a testing laboratory's authorized person and counter signed by the Contractor. The testing agency shall provide all tests, reports, certifications and other documentation sent directly to the SEPTA PM at the same time the results are made available to the Contractor.

I. Promptly reject, segregate (if possible) and mark clearly, work which does not comply with the requirements of the Contract Documents.

J. Develop quality assurance forms in a format acceptable to SEPTA for all major elements of the Work including any additional elements as determined by SEPTA during the progress of the Work.

1.06 SOURCE QUALITY CONTROL ISSUES TO BE ADDRESSED BY THE CONTRACTOR

A. Each Prime Contractor shall provide documentation that each material, manufactured product and/or fabricated item complies with the quality standards of the contract documents.

B. Do not deliver material, manufactured product and/or fabricated items until associated quality assurance documents are accepted by SEPTA.

C. Factory test/inspection schedules shall be submitted to SEPTA a minimum of twenty-one (21) days prior to the test/inspection.

D. SEPTA reserves the right to source inspect any material, manufactured product or fabricated item. Any and all costs related to re-inspection of an unsatisfactory item shall be the responsibility of the Contractor.
F. SEPTA's review of inspections shall not relieve the Contractor from its responsibility for the quality of work.

1.07 SITE QUALITY CONTROL ISSUES TO BE ADDRESSED BY THE CONTRACTOR

A. The QM shall inspect and document material arriving at site to insure conformance to Contract requirements. Nonconforming and damaged material shall be marked and segregated from conforming material to prevent its use until such time as it is removed from site.

B. All materials and equipment shall be protected from rust, corrosion and other damage by either factory applied or field applied protective coatings. Clean and touch-up all surfaces that become scratched marred or otherwise damaged.

C. Unless specifically allowed elsewhere in the Contract, do not deliver reconditioned material at site. Protect all stenciled markings, labels and any other type of identification(s) to clearly identify the originality of the material.

D. As soon as the material arrives at site, (but before beginning installation) provide to SEPTA the original Bill of Lading and Certification that the material complies with the requirements of the contract documents.

E. Do not begin installation until all installation related shop drawings have been reviewed by SEPTA. Installation shall comply with conformed shop drawings. If installation cannot proceed as described in the shop drawings, notify the SEPTA PM immediately for direction. Do not install material or equipment using supplies or techniques not in compliance with shop drawings.

F. Perform necessary and specified tests upon receipt and document the results. Replace material does not meet the requirements of the contract documents.

G. Remove and replace new or existing material that is damaged in storage or in the performance of Work unless specifically accepted in writing by SEPTA's Project Manager.

H. No Work shall be performed at the site if Contractor's Superintendent or his authorized representative, as approved by SEPTA, is not present at the location where Work is being performed.

I. Install field samples/ mock ups at the site as required by individual specification sections for SEPTA approval.

J. Submit final reports and test(s) data to SEPTA as required by the Contract documents.
1.08 NON-CONFORMANCE REPORTS

A. A non-conformance report (NCR) shall be issued when any material or component does not meet the requirements of the contract documents in the opinion of the SEPTA Project Manager or other approved SEPTA personnel.

B. Once issued, the Contractor has ten (10) days to challenge the NCR in a written response to the SEPTA PM.

C. Any NCR not withdrawn in writing by the SEPTA PM or other approved SEPTA personnel, must be corrected in a timely manner.

D. The Contractor is obliged not to proceed with any work which would cover or reduce access to the non-conforming work.

1.09 CONTENTS OF AN INSPECTION AND TESTING PLAN

The Inspection and Testing Plan must be specific and not generic; tailored to the actual requirements of the project. Plans shall include the following items:

A. Organization & Responsibilities
   1. Provide an organizational chart showing who has responsibility for quality control functions and how they interact with the rest of the project team.
   2. Supply brief resumes of key personnel.
   3. Document how the QA/QC personnel will oversee the QA/QC activities subcontractors and fabricators.

B. Procedures and Documentation
   1. Samples of logs and checklists to be used in QA/QC activities.
   2. A schedule of tests, inspections and mock-ups required by the contract documents and governmental authorities.
   3. Procedures which guarantee that any material which must meet a specific test or other definition of quality is delivered to the job site accompanied by written verification that the material does meet these requirements. Included in this procedure is the process of gathering this information and retaining it by the contractor.
   4. Procedures which insure that handling and storage instructions are obtained and followed for all material.
   5. Procedures that insure that the contractor effectively controls documents at the job site. Included in this responsibility is a requirement that a copy of the most current construction documents is present at the job site at all times; including but not limited to...
drawings, specifications, addendum items, change orders and RFI's.

C. Inspection and Testing Activities

1. List of inspection devices to be used by the contractor or a subcontractor which must be calibrated, the proposed frequency of calibration and who will calibrate them.

2. Procedures to insure that testing and inspections will be done in a timely manner and will not negatively impact the progress of the work.

3. Procedures to insure that mock-ups and preinstallation conferences are done in a timely manner and give the SEPTA PM sufficient time to participate and review them without negatively impacting the schedule.

4. Procedures that insure that material which fail tests or inspections is identified and segregated.

D. Audit Activities

1. Define how the QA/QC efforts for key construction activities will be audited and how the results of this audit will be presented to the job Superintendent.

2. Define when anticipated audits may be implemented.

END OF SECTION 01400
NO TEXT THIS PAGE
SECTION 01410
TESTING AND INSPECTION SERVICES

PART I GENERAL

1.01 DESCRIPTION

A. SEPTA shall employ a testing and inspection agency fully licensed and competent in the field of testing and inspecting specific elements of the project.

B. The required testing and inspections shall include the tests commonly used in the construction industry including but not limited by those called for in the attached technical sections.

C. Each prime contractor, and their subcontractors, is required to cooperate fully with testing and inspection activities carried out by SEPTA and its agents. The contractor will provide the SEPTA PM with adequate (as determined by the SEPTA PM) notification, for all activities which require testing and/or inspection. For all inspections and testing required by code, work may not proceed until this testing and inspection has been completed.

1.02 RELATED WORK

A. Agreement

B. Section 01400

1.03 SUBMITTALS

A. Prior to start of Work, submit testing and inspection agency name, address, and telephone number, and names of full time specialists and registered Engineers and responsible officer.

B. Submit a copy of the agency’s laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

C. Provide schedule of agency’s activities commitment with the Contractor(s) schedule and work to be provided.
D. Other information and qualifications to allow SEPTA to determine their appropriateness for the tasks involved.

1. After each inspection and test, promptly submit a copy of draft results directly to the SEPTA PM without contractor review.

2. Include:
   a. Date issued,
   b. Project title and number,
   c. Name of inspector,
   d. Date and time of sampling or inspection,
   e. Identification of product and specifications section,
   f. Location in the Project,
   g. Type of inspection or test,
   h. Date of test or inspection,
   i. Results of tests or inspection,
   j. Conformance with Contract Documents.

3. When requested by SEPTA, provide clarification and interpretation of test/inspection results.

1.04 QUALITY ASSURANCE

A. The testing and inspection agency shall be approved by SEPTA.

B. The Laboratory shall comply with requirements of most current edition of ASTM E329 as well as ASTM C1021, Sealants; ASTM C1077 Concrete; ASTM C1093, Masonry...etc.

C. Laboratory: Authorized to operate in the Commonwealth of PA.

D. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

E. Testing Equipment: All equipment must be calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants defined by industry standards.

F. Testing, when required, shall be the strictest of all pertinent codes and regulations, including selected standards of the American Society for Testing and Materials.

G. All site testing and taking of specimens and samples shall be performed
in the presence of the Contractor's Superintendent and the SEPTA PM unless the PM waives the right to be present, in writing.

H. No testing required by the contract documents or common industry practice may be waived or altered without the written permission of SEPTA’s Assistant General Manager of Engineering, Maintenance and Construction or SEPTA’s Chief Engineer.

1.05 PRODUCT HANDLING

A. The Contractor shall comply with pertinent provisions of Section 01600.

B. The Contractor shall promptly process and submit required copies of test reports and related instructions to assure necessary retesting and replacement of materials without any possible delay in the progress of the Work.

1.06 CONTRACTOR’S RESPONSIBILITIES

A. Representatives of the testing and inspection agency shall have access to the Work at all times and at all site and off site locations, including manufacturing and fabrication facilities. The Contractor shall provide whatever support is required to enable the agency to perform its functions properly.

B. By advance discussion with the testing agency, the Contractor shall determine the schedule required for the agency to perform its tests and inspections and to issue each of its findings. The contractor is solely responsible for any delays caused by testing and inspection services.

C. The Contractor shall provide all required testing and inspection time within the approved construction schedule.

D. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

E. Provide incidental labor and facilities:
   1. to provide access to Work to be tested or inspected,
   2. to obtain and handle samples at the site or at source of Products to be tested,
   3. to facilitate tests and inspections,
   4. to provide storage and curing of test samples.
F. Notify the SEPTA PM, 48 hours prior to expected time for operations requiring inspecting and testing services.

G. When initial tests indicate non-compliance with the Contract Documents, subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency, at no additional cost to SEPTA.

H. Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

END OF SECTION 01410
SECTION 07841
PENETRATION FIRESTOPPING

PART 1 - GENERAL

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

1.02 SUMMARY
A. Section Includes: Penetrations in fire-resistance-rated walls.
B. Related Requirements:
1. Section 07842 "Joint Firestopping" for joints in or between fire-resistance-rated construction.

1.03 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.

C. Qualification Data: For Installer.

D. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.04 CLOSEOUT SUBMITTALS
A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.05 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.

1.06 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

2.01 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 UL in its "Fire Resistance Directory."

2.02 PENETRATION FIRESTOPPING SYSTEMS
A. Penetration Firestopping Systems: Select and provide systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated, for each penetration condition in fire-resistance rated construction assemblies. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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

   a. 3M Fire Protection Products.
   c. Grabber Construction Products.
   d. Hilti, Inc.
   e. HOLDRITE.
   f. NUCO Inc.
   g. Passive Fire Protection Partners.
   h. RectorSeal.
   i. Specified Technologies, Inc.
   j. Tremco, Inc.

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 (2.49 Pa).

   1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
C. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

D. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:
   1. Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

E. 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.

2.03 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.


2.04 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 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.

3.04 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.

3. Designation of applicable testing and inspecting agency.

4. Date of installation.

5. Manufacturer's name.

6. Installer's name.

3.05 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.

3.06 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.

END OF SECTION 07841
SECTION 07842
JOINT FIRESTOPPING

PART 1 - GENERAL

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

1.02 SUMMARY
A. Section Includes: Joints in or between fire-resistance-rated constructions.
B. Related Requirements:
   1. Section 07841 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.

1.03 SUBMITTALS
A. Product Data: For each type of product.
B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency’s illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer’s fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
C. Qualification Data: For Installer.
D. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.04 CLOSEOUT SUBMITTALS
A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer’s written instructions.

1.05 PROJECT CONDITIONS
A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
B. Install and cure joint firestopping systems per manufacturer’s written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.
1.06 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Joint Firestopping Systems" Article.

   a. Joint firestopping systems shall bear classification marking of UL in its "Fire Resistance Directory."

2.02 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Select and provide systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed, for each condition in fire-resistance rated construction assemblies. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints In or Between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

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

   a. 3M Fire Protection Products.
   c. Blazeframe Industries.
   d. Grabber Construction Products.
   e. Hilti, Inc.
   f. Metal-Lite.
   g. Nelson Firestop; a brand of Emerson Industrial Automation.
   h. NUCO Inc.
   j. RectorSeal.
   k. Roxul Inc.
   l. Specified Technologies, Inc.
   m. Thermafiber, Inc.; an Owens Corning company.
   n. Tremco, Inc.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION
   A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
      1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistant rating.
      2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill 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 joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.03 INSTALLATION
   A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.

2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.

3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:


2. Contractor’s name, address, and phone number.

3. Designation of applicable testing agency.

4. Date of installation.

5. Manufacturer’s name.

6. Installer’s name.

3.05 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.
3.06 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07842
NO TEXT THIS PAGE
SECTION 08710

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.

C. Related Sections:

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.2 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Content: Include the following information:
   a. Type, style, function, size, label, hand, and finish of each door hardware item.
   b. Manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
   e. Explanation of abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for door hardware.
   g. Door and frame sizes and materials.
   h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
   a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
   b. Complete (risers, point-to-point) access control system block wiring diagrams.
   c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.
E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.3 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project’s vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures.

I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.6 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:
1. Twenty five years for manual surface door closer bodies.
2. Five years for motorized electric latch retraction exit devices.
3. Two years for electromechanical door hardware.

1.7 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner’s continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers’ names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:

   a. Two Hinges: For doors with heights up to 60 inches.
   b. Three Hinges: For doors with heights 61 to 90 inches.
   c. Four Hinges: For doors with heights 91 to 120 inches.
   d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
   a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
   b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.

3. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
   a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

4. Acceptable Manufacturers:
   a. Bommer Industries (BO).
   b. Hager Companies (HA).
   c. McKinney Products (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Acceptable Manufacturers:
   a. Bommer Industries (BO).
   b. McKinney Products (MK).
   c. Pemko Manufacturing (PE).

C. Floor Closers: ANSI/BHMA A156.4 certified floor closers. Provide independent and adjustable valves for closing speed, latch speed, and backcheck with built-in dead stop and hold open features as specified. Provide finished cover plates or thresholds as indicated in door Hardware Sets.

1. Acceptable Manufacturers:
   a. Rixson Door Controls (RF).

D. Pivots: ANSI/BHMA A156.4, Grade 1, certified. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Acceptable Manufacturers:
   a. Rixson Door Controls (RF).
2.3  POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:
   a. McKinney Products (MK) - QC (# wires) Option.

B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

1. Acceptable Manufacturers:
   a. Pemko Manufacturing (PE) – EL-CEPT Series.
   b. Securitron (SU) - EL-CEPT Series.

C. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
   b. McKinney Products (MK) - Connector Hand Tool: QC-R003.

2. Acceptable Manufacturers:

2.4  DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:
   a. Burns Manufacturing (BU).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Acceptable Manufacturers:
   a. Yale Locks and Hardware (YA).

C. Cylinders: Original manufacturer cylinders complying with the following:

   1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
   4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

D. Keying System: Each type of lock and cylinders to be factory keyed.

   1. Conduct specified “Keying Conference” to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

   1. Change Keys per Cylinder: Two (2) Three (3).
   2. Master Keys (per Master Key Level/Group): Five (5).
F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):
   1. Provide keying transcript list to Owner’s representative in the proper format for importing into key control software.
   2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Acceptable Manufacturers:
      a. Lund Equipment (LU).
      b. MMF Industries (MM).
      c. Telkee (TK).

I. Key Control Software: Provide one network version of “Key Wizard” branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into “Key Wizard” software.

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Acceptable Manufacturers:
      b. Sargent Manufacturing (SA) – 8200 Series.
      c. Yale Locks and Hardware (YA) – 8800FL Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer’s standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 ELECTROMAGNETIC LOCKING DEVICES

A. Surface Electromagnetic Locks (Heavy Duty): Electromagnetic locks to be surface mounted type conforming to ANSI A156.23, Grade 1 with minimum holding force strength of 1,200 pounds. Locks to be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in Hardware Sets, provide specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having a lifetime replacement warranty.

1. Acceptable Manufacturers:

2.9 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for “Panic Hardware” according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.

   a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
   b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.

9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Commercial Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Fabricate latchbolts from cast stainless steel, Pullman type, incorporating a deadlocking feature.

   1. Acceptable Manufacturers:
      a. Yale Locks and Hardware (YA) - 6000 Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. **Cycle Testing:** Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

4. **Size of Units:** Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. **Closer Arms:** Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

6. **Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.**

7. **Closer Accessories:** Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. **Door Closers, Surface Mounted (Heavy Duty):** ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. **Acceptable Manufacturers:**
   a. Corbin Russwin Hardware (RU) – DC6000 Series.
   b. Norton Door Controls (NO) - 7500 Series.
   c. Yale Locks and Hardware (YA) - 4400 Series.

C. **Door Closers, Surface Mounted (Cam Action):** ANSI/BHMA 156.4, Grade 1 certified surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. **Acceptable Manufacturers:**
   a. Corbin Russwin (RU) - DC5000 Series.
   b. Norton Door Controls (NO) - 2800ST Series.
   c. Sargent Manufacturing (SA) - 422 Series.

### 2.11 ARCHITECTURAL TRIM

A. **Door Protective Trim**
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2” less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1” less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.

4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.

6. Acceptable Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

2.12 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Acceptable Manufacturers:
   a. Hiawatha, Inc. (HI).
   b. Rockwood Manufacturing (RO).
   c. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
1. Acceptable Manufacturers:
   a. Rixson Door Controls (RF).
   b. Rockwood Manufacturing (RO).
   c. Sargent Manufacturing (SA).

2.13 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Acceptable Manufacturers:
   1. National Guard Products (NG).
   2. Pemko Manufacturing (PE).

2.14 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
1. Acceptable Manufacturers:
   a. Securitron (SU) - DPS Series.

B. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Acceptable Manufacturers:
   a. Securitron (SU) - BPS Series.

2.15 FABRICATION
   A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.16 FINISHES
   A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

   B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer’s standards, but in no case less than specified by referenced standards for the applicable units of hardware

   C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

   B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.
3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.


3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.
3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner’s maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RF - Rixson
4. RO - Rockwood
5. YA - Yale
6. SA - Sargent
7. SU - Securitron
8. NO - Norton
## Hardware Sets

### Set: 1.0

<table>
<thead>
<tr>
<th>Door Set</th>
<th>Description</th>
<th>Part Number</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>3 Hinge (heavy weight)</td>
<td>T4A3386</td>
</tr>
<tr>
<td></td>
<td>1 Magnetic Lock</td>
<td>M62FGBD</td>
</tr>
<tr>
<td></td>
<td>1 Rim Exit Device</td>
<td>6100 TE626F</td>
</tr>
<tr>
<td></td>
<td>1 Cylinder</td>
<td>1109 CMK</td>
</tr>
<tr>
<td></td>
<td>1 Door Closer</td>
<td>CLP7500</td>
</tr>
<tr>
<td></td>
<td>1 Kick Plate</td>
<td>K1050 10&quot; 4BE CSK</td>
</tr>
<tr>
<td></td>
<td>3 Silencer</td>
<td>608 (or) 609</td>
</tr>
<tr>
<td></td>
<td>1 Push Button</td>
<td>PB3ER</td>
</tr>
<tr>
<td></td>
<td>1 Power Supply</td>
<td>BPS (type as required)</td>
</tr>
<tr>
<td></td>
<td>1 Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
</tr>
</tbody>
</table>

Notes: Connect power supply to fire alarm system.
Electronic Operation: Remote push button momentarily releases magnetic lock. Free egress is not permitted, subject to approval from AHJ. In case of power loss or fire alarm, door remains locked, mag lock drops allowing free egress.

### Set: 1.1

<table>
<thead>
<tr>
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<tr>
<td></td>
<td>1 Cylinder</td>
<td>2153 CMK</td>
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<tr>
<td></td>
<td>1 Door Closer</td>
<td>R (or) PR7500</td>
</tr>
<tr>
<td></td>
<td>1 Kick Plate</td>
<td>K1050 10&quot; 4BE CSK</td>
</tr>
<tr>
<td></td>
<td>1 Door Stop</td>
<td>403 (or) 441CU</td>
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<td>1 Keyswitch</td>
<td>MKN</td>
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<td>1 Power Supply</td>
<td>BPS (type as required)</td>
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<tr>
<td></td>
<td>1 Wiring Diagram</td>
<td>Elevation and Point to Point as Specified</td>
</tr>
</tbody>
</table>

Notes: Connect power supply to fire alarm system.
Electronic Operation: Keyswitch momentarily releases magnetic lock. Free egress is not permitted, subject to approval from AHJ. In case of power loss or fire alarm, door remains locked, mag lock drops allowing free egress.
permitted, subject to approval from AHJ. In case of power loss or fire alarm, door remains locked, mag lock drops allowing free egress.

**Set: 2.0**

Doors: 12A, 5A

<table>
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<th>Item</th>
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<th>Description</th>
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Doors: 1, 14, 16, 8, 9

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Door Hardware 08710-20
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<td>1 Dust Proof Strike</td>
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<td>2 Flush Bolt (manual)</td>
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Notes: Free egress is not permitted.
3 Silencer 608 (or) 609 RO

**Set: 9.0**

3 Hinge TA2314 US32D MK
1 Mortise Lock (storeroom) TER3 8805RL CMK 626 YA
1 Surface Closer 2800ST 689 NO
1 Kick Plate K1050 10" 4BE CSK US32D RO
3 Silencer 608 (or) 609 RO

Notes:

**Set: 10.0**

Doors: Glass Door

2 Floor Closer SC 328N 95 626 RF
2 Top Pivot By Patch Fitting supplier
2 Cylinder 2153 CMK 626 YA

Notes: Balance of hardware by door supplier.

**END OF SECTION 087100**
SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass for glazed platform partitions, including glass standoff fittings and laminated interlayer with custom graphics.
2. Basic glass and glazing requirements for glass in point-supported glazing assemblies, including silk-screened (fritted) patterned glass.

B. Related Requirements:

1. Section 08814 "Bullet-Resistant Glass Barrier Assemblies" for ballistic-resistant glazing in customer service booth and in vision panels in customer service booth doors.
2. Section 08965 "Point-Supported Glazed Assemblies" for structural-sealant-glazed headhouse assemblies including silk-screened (fritted) patterned glass.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.


1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.
1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
   1. Include exposed polished edges on at least two sides of Samples and including one corner.

C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer glass testing agency and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For glazing sealants, for tests performed by a qualified testing agency.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Preconstruction adhesion and compatibility test report.

E. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association’s Certified Glass Installer Program.

B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
1.8 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.11 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.
2. Design Snow Loads: As indicated on Drawings.
3. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Silk-Screened (Fritted) Glass: Silk-screened glass with decorative ceramic frit applied and heat-fused to glass surface.

D. Ultraclear Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3; and with visible light transmission of not less than 91 percent.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with interlayer types indicated to comply with interlayer manufacturer's written instructions.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

B. Graphic Interlayer: Polyvinyl butyral (PVB) interlayer suitable for colored graphic images of custom design.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Eastman Chemical Company; Vanceva® or approved equal.

2. Colors: As selected by Architect from Pantone® Color System.

2.6 GLASS FITTINGS

A. Post-Mounted Glass Standoff Fittings: Stainless-steel fittings for supporting structural glass panels and attaching to steel support members; with adjustable bolt and tapered button face.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Stella (stellaglasshardware.com); ST503T-S or approved equal.
2. Material: Fabricate fittings from Type 316 stainless-steel, with fine machined finish.
3. Securement Method: Two discreet holes in button face provide access to adjusting and tightening mechanisms.

B. Accessories: Provide standoff fitting manufacturer's recommended devices and gaskets of type required to mount glass fittings to supporting structure and to support glass.

2.7 GLAZING SEALANTS

A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers’ written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing
materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners to produce a pencil edge detail.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant unless otherwise indicated.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape unless otherwise indicated.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 GLASS SCHEDULE

A. Glass Type for Glazed Platform Partitions: Clear laminated glass with two plies of fully tempered float glass.

1. Minimum Thickness of Each Glass Ply: 6 mm.
2. Interlayer Thickness: 0.060 inch (1.52 mm).
4. Safety glazing required.

B. Glass Type for Point-Supported Glazing Assemblies: As specified in Section 08965 "Point-Supported Glazed Assemblies."

1. Coating Location: Inner surface of laminated glass unit as indicated or directed.
3. Pattern: Custom design as indicated on Drawings.

END OF SECTION 08800
NO TEXT THIS PAGE
SECTION 08965
POINT SUPPORTED GLAZED ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Point-supported structural-sealant-glazed horizontal (overhead) and vertical enclosure assemblies with bolted connections using stainless-steel structural glass fittings.

B. Related Requirements:

1. Section 08800 "Glazing" for basic glass and glazing requirements, and for requirements for integral applied coatings on glass.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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.
2. Include material descriptions and installation instructions for glazing tapes, compounds, gaskets, and other materials.

B. Shop Drawings: For point-supported structural glazed assemblies. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of point-supported structural glazed assemblies, showing the following:
   a. Joinery, including concealed welds.
   b. Anchorage.
   c. Expansion provisions.
   d. Glazing.
   e. Flashing and drainage.

C. Samples for Verification: For each type of exposed finish required, as follows:

1. Glass: 12 inches (305 mm) square for each type, with edges finished as specified.
2. Structural Glass Fittings: Full-size for each type of fitting.
3. Gaskets and Sealants: 12 inches (305 mm) long for each type.
D. Delegated-Design Submittal: For point-supported structural glazed assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Indicate that stresses induced in glass by the fittings are compatible with strength of glass and comply with performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and field testing agency.

1. Include letter signed by representative of point-supported structural glazed assembly manufacturer that Installer is acceptable and qualified to install system.

B. Product Test Reports: For point-supported structural glazed assemblies, for tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency.

C. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

D. Source quality-control reports.

E. Field quality-control reports.

F. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For point-supported structural glazed assemblies to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For point-supported structural glazed assemblies to include in maintenance manuals. Include ASTM C 1401 recommendations for postinstallation-phase quality-control program.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company with not less than 5 years experience in the manufacture of point-supported structural-glazed systems of the type required for this Project, for projects located in the U.S.

1. System Responsibility: Manufacturer shall provide glass and glazing materials, fittings and accessories, and shall assume sole responsibility for system design.

2. Engineering Responsibility: Manufacturer shall prepare data for point-supported structural glazed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. System Responsibility: Installer shall assume responsibility for supplying and erecting the complete point-supported structural-glazed system; coordinating and maintaining tolerances between structure and glazing system with individual suppliers and manufacturers and with Installers of adjacent and related construction; and for installation of the glazing systems using its own personnel.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

D. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

E. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of point-supported structural glazed assemblies that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 12 years from date of Substantial Completion.

B. Special Installer’s Warranty: Standard form in which Installer agrees to repair or replace components of point-supported structural glazed assemblies that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design point-supported structural glazed assemblies.
B. General Performance: Comply with performance requirements specified, as determined by testing of point-supported structural glazed assemblies representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Point-supported structural glazed assemblies shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:
   a. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Seismic Performance: Point-supported structural glazed assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.

F. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

G. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.
2. Designed to produce tensile or shear stress of less than 20 psi (138 kPa).
H. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by point-supported structural glazed assemblies without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.

1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Pilkington Planar, with Planar Series 905J fittings unless otherwise indicated or recommended by manufacturer to accommodate Project conditions.


B. Source Limitations: Obtain all components of point-supported structural glass system, including glass, fittings and accessories, from single manufacturer.

2.3 GLAZING

A. Glazing: Comply with Section 08800 "Glazing" and with the following requirements, which supersede those specified in Section 08800 "Glazing":

1. All glass used in point-supported structural glazed assemblies shall be fully tempered and heat soaked ultraclear (low-iron) glass, and shall comply with the following:
   
   a. Certified to be tempered to minimum compressive strength of 16,000 psi.
   b. Heat soaked to comply with European DIN standard.
   c. Heat soak tested to convert nickel sulfide inclusions from the alpha phase to the beta phase so glass will fracture in the test.

2. Interlayer in Laminated Glass Units: DuPont; SentryGlas Plus (SGP) interlayer. Do not used PVB interlayer materials.

3. Glass Edges: Ground flat with frosted appearance unless otherwise indicated.

4. Glass Fabrication: Fabrication of tempered glass, including edgework, holes and notches, shall be completed before tempering to comply with the following:

   a. Dimensional Tolerance for Panel Size: Plus or minus 1.0 mm of the theoretical dimension required.
   b. Squaresness of Each Panel: Within 3.0 mm.
   c. Bow Allowance: 0.1 percent.
   d. Positional Tolerance for Holes: Plus or minus 1.0 mm from a single datum point.
   e. Glass Flatness: Average roller-wave distortion certified not to exceed 0.0007 inch, with maximum sag at leading and trailing edges of 0.25 mm.
f. Glass Manufacture: Glass shall be manufactured in a factory where quality control procedures have been created under the terms of ISO 9000 and are independently monitored.

g. Glass Pre-Stressing: Pre-stress glass around holes to a level that is compatible with design and use of fittings. Verify by differential surface refractometer on stress level.

5. **Fritted Laminated Glass for Overhead Glazing:**

   a. **Coating Location:** Inner surface of laminated glass unit as indicated or directed.
   b. **Coating Color:** White to match Architect’s sample.
   c. **Pattern:** Custom design as indicated on Drawings.

B. Point Support Structural Glass Fittings: Retain structural glass systems at points as indicated, by means of stainless-steel spider-type fittings.

1. Fabricate fittings predominantly from Type 316 stainless-steel, with smooth machined or mechanical finish.
2. Provide fittings and accessories of type and at locations recommended by point-supported structural glazed manufacturer to suit conditions of installation and to comply with performance requirements.
3. Supply fittings designed to provide flush appearance on outward surface of glazing system, without the use of exterior fittings or plates.
4. Provide spring plate and gusset members as recommended by manufacturer to prevent stress concentration at hole positions and to accommodate loads and stresses indicated and the following:

   a. Thermal movements resulting from differential coefficients of thermal expansion within range indicated. System components shall withstand noiselessly all thermal movements without buckling, distortion, cracking, failure of joint seals or undue stress on glass or fixing assemblies.
   b. Deflection of edge beams due to loading applied after erection of cladding.
   c. Maximum side sway of structure due to wind load and seismic movement.
   d. Deflection due to self weight of point-supported structural glazed systems.
   e. Inward and outward movements due to design loads.

5. Provide fittings without exterior plates, caps, discs or buttons, and with accessories complying with the following:

   a. **Fittings for Overhead Glazing:** Planar Type 905 fittings with flush countersunk bolt.
   b. Countersunk Bolts: Type 303 Type 316 stainless-steel, bright machine finished, socket head bolt of 1-1/8 inch diameter with hexagonal shank.
   c. **Caps for Fittings:** 50-mm diameter unless otherwise indicated or required.
   e. Gaskets: Fully vulcanized fiber, neoprene, or precured silicone.
6. Incorporate movement diaphragms of stainless-steel and flexible discs into
connections to accommodate oversize holes in spring plate members and to
accommodate glass movement and manufacturing tolerances.
7. Design support systems that provide for unitized pre-assembly of all items prior
to glass erection.

C. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that
is compatible with system components with which it comes in contact, specifically
formulated and tested for use as structural sealant and approved by structural-sealant
manufacturer for use in point-supported structural glass assembly indicated.

   1. Color: As selected by Architect from manufacturer's full range of colors.

D. Glazing Gaskets: Manufacturer's standard fully vulcanized fiber, neoprene or precured
silicone glazing gaskets, setting blocks, and shims or spacers.

E. Glazing Sealants: As recommended by manufacturer.

2.4 FABRICATION

A. Weld in concealed locations to greatest extent possible to minimize distortion or
discoloration of finish. Remove weld spatter and welding oxides from exposed
surfaces by descaling or grinding.

B. Fabricate components that, when assembled, have the following characteristics:

   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing
to maintain required glazing edge clearances.
   5. Fasteners, anchors, and connection devices that are concealed from view to
greatest extent possible.

C. After fabrication, clearly mark components to identify their locations in Project
   according to Shop Drawings.

2.5 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401
   recommendations including, but not limited to, assembly material qualification
   procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, 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 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Install components plumb and true in alignment with established lines and grades.

C. Install glazing as specified in Section 08800 "Glazing."

1. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install point-supported structural glazed assemblies to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

   a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
   b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
   c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.
3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of point-supported structural glazed assemblies.

C. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

1. Test a minimum of six areas on each building facade.
2. Repair installation areas damaged by testing.

D. Point-supported structural glazed assemblies will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 08965
SECTION 12931
MILD STEEL STRAP BENCHES

PART 1 – GENERAL

1.01 Description

A. The work of this section consists of the fabrication and delivery of steel benches with a powder coat finish as shown and in the quantities as specified herein.

B. The Contractor shall be responsible for all materials, labor and transportation required for delivery of complete assemblies to a location(s) designated elsewhere in the Contract Documents.

C. SEPTA shall be responsible for final installation.

1.02 Submittals

A. Provide (3) copies of manufacturer's catalog cuts, color charts and product literature including finishing process guidelines.

B. Manufacturer shall supply certification of preparation and finishing processes as specified herein.

PART 2 – PRODUCTS

2.01 Products


B. JAS Bench by Conceptual Site Furnishings, 900 47th Street Suite B Wyoming, MI 49509, Phone: 616.940.9830 F

C. Or Approved Equal. Equals shall be judged during the technical evaluation process by SEPTA’s project manager.

2.02 Design Criteria

A. The aesthetic of the bench shall match that which is shown on the drawing. Nominal perimeter framing and slat sizes and shapes shall be maintained.

C. Size: Benches shall have seats 96” minimum in length, and 20” minimum and 24” maximum in depth.

D. Back Support: Back support shall be 42” minimum in length and shall extend from a point 2” maximum above the seat surface to a point 18” minimum above the seat surface. Back support shall be 2 ½” maximum from the rear edge of the seat measured horizontally.

E. Height: The top of the bench seat shall be 17” minimum and 19” maximum above the floor, measured to the top of the seat.

F. Structural Strength: Allowable stresses shall not be exceeded for materials used where a vertical or horizontal force of 250 pounds is applied at any point on the seat, fastener mounting device, or supporting structure.

2.03 Fabrication

A. Steel slats shall be nominal 1 1/2” to 2” bar stock. Laser cut sheet is unacceptable.

B. Material
   1. Steel section plates, shapes and bars: ASTM A36.
   2. Steel welded and seamless pipe: Schedule 40 and 80, ASTM A120, A53 and A36.
   3. Rectangular steel HSS: ASTM A500, grade B.

C. Finish:
   1. Refer to Section Shop Applied Metal Finishes - 05080
   2. Color Custom Color

PART 3 – EXECUTION

3.01 Not Used

END OF SECTION
SECTION 12933

MILD STEEL TRASH AND RECYCLING COMBINATION RECEPTACLES

PART 1 – GENERAL

1.1 Description

A. The work of this section consists of the fabrication and delivery of steel trash and recycling combination receptacles with a powder coat finish as shown and in the quantities as specified herein.

B. The Contractor shall be responsible for all materials, labor and transportation required for delivery of complete assemblies to a location(s) designated elsewhere in the Contract Documents.

C. SEPTA shall be responsible for final installation.

1.2 Submittals

A. Provide (3) copies of manufacturer’s catalog cuts, color charts and product literature including finishing process guidelines.

B. Manufacturer shall supply certification of finishing process as specified herein and noted on the schedule on the drawing.

1.3 Delivery, Storage and Handling

A. Delivery and Handling: Transport and handle units in a manner recommended by the manufacturer to prevent damage and defects of whatever nature.

B. Storage: Store units in accordance with their manufacturer’s recommendations.

PART 2 – PRODUCTS

2.1 Products

A. SD-242, Ironsites Series as manufactured by Victor Stanley, Inc. PO Drawer 330, Dunkirk, MD 20754, Phone: (301) 855-8300, or

B. CRTR2, Carnival Series as manufactured by Thomas Steele, 1080 Uniek Drive, Waunakee, WI 53597, Phone: (608) 849-1080, or

C. Or Approved Equal. Equals shall be judged during the technical evaluation process by SEPTA’s project manager.

2.2 Fabrication
A. Steel slats shall be nominal 1 1/2" to 2" bar stock. Laser cut sheet is unacceptable.

B. Lid
   1. Lid shall be flat with a hole for deposits
      a. Trash: 10”-12” diameter hole
         i. Color: Black
      b. Recycling: 5”-6” diameter hole
         i. Color: Bright Blue

C. Material
   1. Steel section plates, shapes and bars: ASTM A36.
   2. Steel welded and seamless pipe: Schedule 40 and 80, ASTM A120, A53 and A36.
   3. Square & rectangular steel HSS: ASTM A500, grade B.

D. Finish:
   1. Refer to 05080 Shop Applied Metal Finishes.
   2. Custom color.

PART 3 – EXECUTION

3.1 Not Used

END OF SECTION
SECTION 13852

FIRE DETECTION AND ALARM SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section details the Fire Detection and Alarm System requirements applicable to all Southeastern Pennsylvania Transportation Authority (SEPTA) stations requiring an addressable Fire Alarm Control Panel.

B. This section specifies the materials, equipment, performance and testing for a complete and functional Fire Detection and Alarm System in compliance with federal, Pennsylvania and Philadelphia codes and standards and the Authority Having Jurisdiction (AHJ) requirements.

C. The Fire Detection and Alarm System shall be a "turnkey" system to SEPTA and SEPTA's service and monitoring Contractor of Record.

D. Contractor is responsible for all electrical Work related to the Fire Detection and Alarm Systems unless otherwise indicated.

E. Contractor is responsible to provide electrical power to FACPs and FAPSs as shown on the Contract Drawings.

F. Contractor is responsible for all electrical raceways and site Work for the Fire Detection and Alarm System as shown on the Contract Drawings.

G. Coordination is required between the Fire Protection and Systems Integration Contractors for fire protection system interface connections as shown on the Contract Drawings.

H. Contractor shall coordinate with the SEPTA Project Manager prior to performance of any Work that may affect the existing Fire Detection and Alarm System service.

I. Contractor shall perform demolition of existing Fire Detection and Alarm Systems at the station following Central Station monitoring of new Fire Detection and Alarm System and acceptance by SEPTA.

J. Contractor shall provide two telephone circuits from each DACT to an existing punch-down block within the Communications Room, as shown on the Contract Drawings.

K. Contractor shall utilize leased telephone circuits provided by SEPTA between the punch-down block and the Central Station to allow the Contractor to complete the installation of the Fire Detection and Alarm System. Contractor shall request telephone number assignments from the SEPTA Project Manager.
L. Contractor shall maintain the existing Fire Detection and Alarm Systems operational until the new Fire Detection and Alarm System is monitored by the Central Station and written approval is obtained from SEPTA.

M. SEPTA will provide the Contractor with point and room/area description listings for FACP programming. The point and room/area identification lists will include required abbreviations. The Contractor shall submit the final listing of information that will be transmitted to the Fire Alarm Monitoring Service to SEPTA for approval prior to programming the FACPs.

1.02 RELATED WORK

A. Division 1: General Requirements
B. Section 01720: Project As-Built Documents.
C. Section 01830: Operation and Maintenance Data
D. Section 02070: Selective Demolition
E. Section 16010: Basic Electrical Requirements
F. Section 16060: Grounding and Bonding
G. Section 16070: Hangers and Supports
H. Section 16075: Electrical Identification
I. Section 16120: Conductors and Cable
J. Section 16130: Raceways and Boxes
K. Section 16131: Conduit
L. Section 16700: Communications

1.03 SUBMITTALS

A. Submittals as described in Section 01300, Submittals.
B. Certifications and Licenses required for Quality Assurance in Article 1.04.
C. Bill of Materials for each Fire Detection and Alarm system.
D. Manufacturers’ catalog cut sheets including UL Listings, FM Approvals, compatibility listings and other descriptive information to provide sufficient detail in determining compliance with this Section including but not limited to the following:
   1. Fire Alarm Control Panel
   2. Fire Alarm Annunciator Panels
   3. Fire Alarm Annunciator Panel Cabinets
   4. Fire Alarm Power Supplies
   5. FACP Batteries
   6. FAPS Batteries
   7. Battery Cabinets
9. Smoke Detectors
10. Heat Detectors
11. Notification Appliances
12. NAC Synchronization modules
13. Monitor Modules
14. Isolation Modules
15. Surge Protection Modules
16. Relay Modules
17. Fire Alarm and Power Cables
18. Remote Circuit Testers
19. Smoke and Heat Detection Testers & Indicators
20. Electrical Materials per Electrical Sections (i.e. interior & weather proof conduit and pull boxes)

E. All submittals shall be approved by SEPTA prior to purchasing equipment.

F. Fire Detection and Alarm System Calculations
   1. Provide Primary and Supplemental Power Supply Calculations for each station’s Fire Detection and Alarm System.
   2. Provide Battery Supply Calculations for each station’s Fire Detection and Alarm System.
   3. Provide Voltage Drop Calculations for each station’s Fire Detection and Alarm System.

G. Shop Drawings
   1. Provide Shop Drawings for station Fire Detection and Alarm System meeting the requirements of NFPA 72.
   2. Shop Drawings shall include the property name and address, device legend, and date.
   3. Shop Drawings shall include floor plan drawings, riser diagrams, control panel wiring diagrams and point-to-point device wiring diagrams.
   4. Shop Drawings shall be drawn to scale and shall include the following information:
      a. Floor identification
      b. Point of Compass
      c. Graphic Scale
      d. All walls and doors
      e. All partitions extending to within 18 inches of the ceiling
f. Room and/or bay descriptions, use and door numbers

g. Fire Alarm controls, annunciators, device/component location

h. Show connections to suppression systems, HVAC, etc.

i. Location of Fire Detection and Alarm primary and secondary power connection(s)

j. Locations of monitor/control interfaces to other systems

k. Riser locations

l. Track crossover locations

5. Fire Detection and Alarm System riser diagrams shall include the following information:

a. General arrangement of the system related to building cross section

b. Number of risers

c. Type and number of circuits in each riser

d. Type and number of Fire Detection and Alarm System components/devices on each circuit, on each floor or level

6. Control panel wiring diagrams shall be provided for all control equipment (i.e. equipment listed as either a control unit or control unit accessory), power supplies, battery chargers and annunciators and shall include the following information:

a. Identification of the control equipment depicted

b. Location(s)

c. All field wiring terminals and terminal identification

d. All circuits connected to field wiring terminals and circuit identifications

e. All indicators and manual controls, including the full text of all labels

f. All field connections to supervising station signaling equipment

g. Releasing equipment

h. Fire safety control interfaces

7. Electrical schematic wiring diagrams shall be provided for the following:

a. Initiating devices

b. Notification appliances

c. Primary Power Supply

d. Battery Power Supply

e. Power supervisory devices

f. End-of-line resistors

g. Remote test stations
Submit a preliminary version of a Fire Detection and Alarm System Manual for approval by SEPTA prior to acceptance of systems in accordance with Section 01830 and as specified herein. Following approval of the Fire Detection and Alarm System Manual, four (4) bound or hardback loose-leaf binder copies shall be provided.

1. The Manual shall be developed for SEPTA personnel and technicians (or 3rd Party Contractor) for Fire Detection and Alarm System operation, testing and maintenance activities specific to each station.

2. The Manual shall be a three ring binder that is labeled with the SEPTA Station name and make and model of the Fire Detection and Alarm System control panel.

3. Individual sheets of the Manual shall be typed and shall be protected by top-loading, heavyweight, clear sheet protectors.

4. The manual shall be indexed and include the following:
   a. Operator instructions for basic system operations and functions including alarm acknowledgements, system reset, interpretation of applicable system outputs (i.e. LEDs).
   b. Detailed narrative description of system inputs, evacuation signaling, ancillary functions, annunciation, intended sequence of operations, expansion capability, application considerations, and limitations.
   c. Listing of the individual system components that require periodic testing and maintenance.
   d. A testing and maintenance schedule shall be developed for each type of device as required by NFPA 72 and as recommended by the Manufacturer.
   e. Step-by-step instructions detailing maintenance and testing instructions for each type of device installed.
   f. Detailed troubleshooting instructions for each trouble condition generated from the monitored field wiring, including opens, grounds, shorts and loop failures and shall include the following:
      1) Flow chart indicating Fire Detection and Alarm System sequence of operations for every type of input, 
      2) List of all trouble signals annunciated by the system, 
      3) Description of the condition(s) that cause such trouble signals, 
      4) Step-by-step instructions describing how to isolate such problems and correct them.
   g. The Manual shall focus on guiding technicians in identifying the sources of problems in specific subsystems and in locating, replacing, and testing specific modular components.
Test Plan detailing the method of testing the FACP including any system being monitored by the FACP.

FACP software program CDs for programming and data. SEPTA shall have the ability to modify the FACP program and data, as desired.

As-built FACP electronic upload program file on CD.

Hard copy of zone listing that describes every Fire Detection and Alarm device type and location.

As-Built Bill of Materials.

Manufacturer’s installation and operation manuals for the FACP and all connected devices.

Names, addresses and telephone numbers of suppliers of system.

As-Built Manufacturers’ catalog cut sheets.

Manufacturer’s installation, testing, and maintenance instructions for each device.

Half-size As-Built Shop Drawings.

1) Rated Horn dB levels shall be indicated on drawings.

As-Built Fire Detection and Alarm System Calculations.

Spare parts list for components of system.

Record of inspection, testing and certification including a complete record of horn dB levels.

A Record of Completion and Test Results.

Copies of letters, inspection reports and approvals of system.

1.04 REFER TO SECTION 01830, OPERATIONS AND MAINTENANCE DATA.

A. All applicable standards, codes and regulations shall be listed in the Shop Drawings with the current edition date. Codes and regulations involving Fire Detection and Alarm sub-systems, connections, etc. shall be similarly listed.

B. Final point and room/area identification and description lists for programming FACP's.

1.05 QUALITY ASSURANCE

A. The following Certifications and Licenses shall be submitted to the SEPTA Project Manager:

1. Commonwealth of Pennsylvania Electrical License
2. City of Philadelphia Electrical License
3. City of Philadelphia Fire Alarm License
4. NICET Level III or IV Fire Alarm System Certification
5. Fire Alarm System Manufacturer’s Authorized Installer Certification

B. Certification of Materials & Equipment
   1. Certification of Materials and Equipment which states that the Materials and Equipment complies with all requirements of this Contract.
   2. Deviations from the Contract shall be approved in writing by the SEPTA Project Manager.
   3. Materials and equipment supplied shall be new.
   4. Materials and equipment shall meet or exceed the latest published specifications of the equipment.
   5. Materials and equipment shall be listed for the specific Fire Detection and Alarm System application for which they are used.
   6. Materials and equipment shall be listed by Underwriter’s Laboratories, Inc. and Factory Mutual Approved for its intended purpose and compatibility.
   7. Materials and equipment are installed in accordance with manufacturer’s instructions, requirements and recommendations.

1.06 APPLICABLE CODES AND STANDARDS

A. Systems shall be designed, installed and tested according to the most recent edition of the following codes and standards:
   1. The Latest Philadelphia Building Code
   2. The Latest Philadelphia Fire Code
   3. NFPA 13 – Installation of Sprinkler Systems
   4. NFPA 14 - Installation of Standpipe, Private Hydrants and Hose Systems
   5. NFPA 70 – National Electrical Code (NEC)
   7. NFPA 86 - Standard for Ovens and Furnaces
   10. NFPA 130 - Standard for Fixed Guideway Transit and Passenger Rail Systems
   11. NFPA 2001 – Clean Agent Fire Extinguishing Systems
   12. NFPA Pub HLH 97 – Electrical Installations in Hazardous Locations
   13. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)
   15. UL 268 – Smoke Detectors for Fire Protective Signaling Systems
16. UL 268A – Smoke Detectors for Duct Applications
17. UL 464 - Standard for Audible Signal Appliances
18. UL 497B – Surge Suppression
19. UL 864 – Control Units for Fire Protective Signaling Systems
20. UL 1638 – Visual Signaling Appliances – Public Mode Emergency and General Utility Signaling
21. FM - Factory Mutual Global

1.07 REFER TO SECTION 01090, REFERENCES.
A. Where conflicts exist between codes, the Fire Detection and Alarm System shall be installed in accordance with the most rigid applicable code or regulation.

1.08 FIRE DETECTION AND ALARM SYSTEM PERFORMANCE
A. Signaling Line Circuits (SLC)
1. SLCs shall be wired to meet the Style 4 performance.
2. T-Tapping is only permitted at a device or in the FACP.
3. The zoning of the Fire Detection and Alarm System shall be configured as shown on the Contract Drawings.

B. Notification Appliance Circuits
1. Notification Appliance shall be wired to meet the Style Y performance.
2. T-Tapping is not permitted.
3. End of line resistor compatible with the FACP is required for supervision.
4. The notification circuits of the Fire Detection and Alarm System shall be configured as shown on the Contract Drawings.

C. UL Central Station Monitoring Circuits
1. UL Central Station Monitoring Circuits shall be wired to meet the Style C performance.

D. Sprinkler systems including limited area sprinkler systems and wet standpipe systems in stations shall be monitored by the main FACP for water flow, valve tamper and low air pressure if applicable.

E. Facilities with other types of active Fire Protection Systems (i.e. Clean Agent, Halon, Dry/Wet Chemical, etc.) shall be monitored for fire, trouble and supervisory alarms by the main FACP.

F. Control interface devices such as equipment shutdown, damper control, and fan shut down, etc. shall be shown on the “As-Built” to include a description of the action.
1.09 DELIVERY, STORAGE AND HANDLING
   A. Deliver material in Manufacturer’s original, unopened, protective packaging.
   B. Store materials in a clean and dry space, protected from weather.
   C. Handle in a manner to prevent damage to finished surfaces.
   D. Smoke and heat detectors shall not be installed until after construction cleanup of all trades is complete and final.

1.10 ENVIRONMENTAL CONDITIONS
   A. The Fire Detection and Alarm System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
      1. System components shall be rated for continuous operation in ambient temperatures of 32 to 120 degrees F and 20 to 90 percent relative humidity, non-condensing.
      2. System components installed in locations exposed to weather or installed on platform levels shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 degrees F and 20 to 100 percent relative humidity, condensing.
      3. Rated for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick.
      4. System components shall function between 150 feet below and 250 feet above sea level.

1.11 HAZARDOUS ENVIRONMENTS
   A. System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, or combustible dust shall be rated, listed, and installed according to NFPA 70.
   B. Pump room wet wells are identified as Class 1, Division 2 Hazardous locations.

PART 2 – PRODUCTS

2.01 GENERAL
   A. The Fire Detection and Alarm System shall be Non-Proprietary as described herein.
   B. Equipment, replacement parts, system training and technical support shall be readily available to any licensed electrical contractor and SEPTA.
   C. Cabinets and devices shall be red unless otherwise approved by SEPTA.
   D. Cabinets shall be secured to walls using channel strut unless otherwise approved by SEPTA.
E. Partial supplements or replacements to the existing Fire Detection and Alarm System materials or equipment are not permitted without the specific written approval of SEPTA.

F. Field conditions may permit the use of existing embedded conduit that is not feasible to replace provided it does not interrupt existing Fire Detection and Alarm System service.

2.02 MANUFACTURERS

A. SEPTA Approved manufacturer for the fire alarm and detection system shall be the following:
   1. SILENT KNIGHT or SEPTA approved equivalent.

2.03 FIRE ALARM CONTROL PANEL (FACP)

A. FACP shall be a Silent Knight Model 5820XL or SEPTA approved equivalent.

B. FACP shall be supplemented by Silent Knight Model 5815XL Loop Expanders for a maximum four (4) Style 4 SLCs or SEPTA approved equivalent.

C. Each SLC shall be capable of supporting 127 addressable points (508 points maximum).

D. FACP shall be non-proprietary, UL Listed and FM Approved.

E. FACP shall be an addressable panel utilizing addressable detection devices.

F. FACP shall be a commercial fire alarm-only panel that is not a combination fire/security panel.

G. FACP shall have six (6) notification appliance circuits (NAC)s.

H. Control panel shall be field programmable and remotely programmable with upload capability.

I. Provide a Silent Knight Model 5660 SKSS Software Suite or SEPTA approved equivalent.

J. Provide Silent Knight Model 5670 SKSS Silent Knight IntelliView Facility Management software or SEPTA approved equivalent.

K. Spare SLC device capacity of 25% of each addressable loop shall be provided unless written approval is obtained from SEPTA.

L. Cabinet shall be factory painted red.

M. Cabinet shall be equipped with a CAT 30 system lock and key.

N. FACP shall include an auxiliary alarm output that will allow a fire, trouble or supervisory signal to be transmitted to a secondary location in addition to the Central Station communications output requirements via a DACT. This secondary alarm output capability shall be available from the panel or through a separate alarm output module, and shall be included to allow a future communications interface by SEPTA to the Control Center.
2.04 UNIVERSAL DIGITAL ALARM COMMUNICATOR (DACT)
   A. DACT shall be UL Listed and FM Approved.
   B. FACP may have a built in DACT or have a separate cabinet.
   C. DACT shall be compatible with SEPTA’s UL Listed Central Station and SEPTA’s telephone system.
   D. DACT shall be capable of reporting all zones or points of alarm, supervisory and trouble as well as all system status information such as loss of AC, low battery, ground fault or loss of supervision to any remote device with individual and distinct messages to the Central Station.

2.05 REMOTE FIRE ALARM ANNUNCIATOR PANEL (FAAP)
   A. FAAP shall be a Silent Knight Model SK-5860 or SEPTA approved equivalent.
   B. FAAP shall be UL Listed and FM Approved with the main FACP.
   C. FAAP shall indicate FACP Fire, Trouble and Supervisory alarm status.
   D. FAAP shall control the FACP Acknowledge, Silence and Reset functions.
   E. FAAP shall be mounted on a 4-inch square weatherproof backbox within the FAAP cabinet.
   F. FAAP cabinet shall be a Hoffman Type 304 stainless steel NEMA 4X rated, vandalism-proof cabinet or SEPTA approved equivalent.
   G. FAAP cabinet shall be equipped with an ASSA system lock and key. Coordinate with SEPTA locksmith department before installing cabinets on wall.
   H. The FAAP cabinet shall be secured to the wall with shallow channel strut and not to exceed beyond cabinet width.

2.06 FIRE ALARM PRIMARY POWER SUPPLY AND (FAPS) BOOSTER
   A. The Fire Detection and Alarm System shall have a dedicated 120VAC, 20 amp circuit breaker. The circuit breaker shall be identified as FIRE ALARM SYSTEM in the electrical power panel.
   B. The dedicated branch circuit shall be protected within metallic raceway as shown on the Contract Drawings.
   C. A circuit breaker lock (that allows the breaker to trip, but does not allow tampering) that is listed for use with the circuit breaker for FACPs and FAPSs shall be provided.
   D. The Fire Detection and Alarm System shall be provided with a primary power supply comprised of FACP power and FAPS boosters to provide 20% expansion capacity.
   E. FAPS shall be Silent Knight Model Firepower 5495 or SEPTA approved equivalent.
F. The failure of either the primary or secondary power supply shall initiate a trouble signal at the FACP and the Central Station.

2.07 BATTERY BACKUP
A. The Fire Alarm System and supplemental power supplies shall be provided with backup battery power.
B. Battery back-up power supply shall be sized to be capable of operating the system under standby load for a period of at least twenty-four (24) hours immediately followed by a period of five (5) minutes in fire alarm condition.
C. Batteries shall be maintenance-free, gelled, sealed type that only requires annual charger and discharge tests as required by NFPA 72.
D. Batteries shall be marked with the month and year of manufacture.
E. Battery chargers shall be capable of fully recharging the batteries from fully discharged in a 24-hour period.
F. Batteries shall be located in a cabinet separate from the FACP and FAPS located as shown on the Contract Drawings.
G. The battery cabinet shall be factory painted red.
H. The battery cabinet shall be equipped with a CAT 30 system lock and key.

2.08 MANUAL FIRE ALARM PULL STATION
A. Fire alarm pull stations shall be Silent Knight Model SD500-PSDA or SEPTA approved equivalent.
B. Fire alarm pull stations shall be dual-action and ADA compliant.
C. Fire alarm pull stations shall be addressable.
D. Fire alarm pull stations shall be equipped with a CAT 30 system lock and key.
E. Fire alarm pull stations that require glass breakage or have crushable tubes to activate are not acceptable.
F. Fire alarm pull stations located in public areas shall be provided with a clear protective weatherproof vandal resistant removable cover. Protective covers shall be a Signal Communications Corp (SigCom) Sentry Station Cover (ST-series model) or SEPTA approved equivalent. The covers shall be fully compliant with all applicable ADA requirements (ADA; 28 CFR Part 36).
G. Protective cover shall not be equipped with a pre-alarm sounder that indicates cover removal.

2.09 SMOKE DETECTORS
A. Smoke detectors shall be Silent Knight Model SD505-APS or SEPTA approved equivalent.
B. Smoke detectors shall be UL Listed and FM Approved with the FACP.
C. Provide a removal tool for the smoke detector. Equipment shall be turned over to SEPTA.
D. Smoke detectors shall be provided with dust covers when initially installed.
E. Smoke detectors shall have a visual indicator to indicate the status of the detector.
F. Unless specifically designed and listed for the expected conditions, smoke detectors shall not be installed if any of the following ambient conditions exist:
   1. Temperature below 32 degrees F
   2. Temperature above 100 degrees F
   3. Relative humidity above 93 percent
   4. Air velocity greater than 300 ft/min
G. Smoke detectors shall not be installed in a manner that will cause false alarms.

2.10 DUCT SMOKE DETECTORS
A. Duct detector housings shall be Silent Knight Model SD505-ADHR or SEPTA approved equivalent.
B. Remote Test Switch shall be a Silent Knight Model SD505-DTS or SEPTA approved equivalent.
C. Duct detector housings shall be UL listed with the respective smoke detector.
D. Duct smoke detectors shall have an easily accessible (chest height) remote tester that indicates the status of the detector and provides a method of performing circuit testing.
E. Duct smoke detectors shall have remote test switches for each duct detector. Coordinate final mounting location with SEPTA project manager.
F. Smoke detector shall meet the requirements of Article 2.10.

2.11 HEAT DETECTORS
A. Heat detectors shall be Silent Knight Model SD505-AHS or SEPTA approved equivalent.
   Elevator Lobby Heat Detector shall be Chemetron WPB501 or SEPTA approved equivalent.
B. Heat detectors shall be UL Listed and FM Approved.
C. Heat detectors shall have an Ordinary temperature classification.
D. Heat detectors shall have a visual indicator to indicate the status of the detector.
E. Heat detectors located in probable high vandalism areas (e.g. station public restrooms) shall be protected by UL listed covers that protect the detector while allowing full operation and inspection.
F. Heat detectors shall not be installed in a manner that will cause false alarms.
2.12 NOTIFICATION APPLIANCES

A. Notification Appliances shall be manufactured by Wheelock, or approved equal as specified below:
   1. Horn/strobe wall unit shall be a Wheelock Model ASWP-2475W-FR with a Model WPBB-R and WP-KIT weatherproof back box or SEPTA approved equivalent.
   2. Strobe wall unit shall be a Wheelock Model RSSWP-2475W-FR with a Model WPSBB-R and WP-KIT weatherproof back box or SEPTA approved equivalent.

B. Notification appliances and their installation shall provide audible and visual signaling in compliance with the ADA Accessibility Guidelines.

C. Strobes shall be synchronized from the FACP power supply or supplemental fire alarm power supply.

D. Notification appliances and associated back boxes shall be painted red, weatherproof, and rated NEMA 3R.

2.13 MONITOR MODULES

A. Monitor modules shall be a Silent Knight Model SD500-AIM / SD500-MIM or SEPTA approved equivalent.

B. Monitor modules shall be used to monitor normally open dry contacts.

C. Monitor modules shall be installed in locations as shown on the Contract Drawings.

D. All sprinkler systems including limited area sprinkler systems and wet standpipe systems in stations shall be monitored by the main FACP for water flow, valve tamper, and low air pressure if applicable.

E. All modules associated with the sprinkler system shall be SD500-MIM and enclosed in a NEMA 4X latching - hinge cabinet adjacent the monitored devices.

F. Facilities with other types of active Fire Protection Systems (Clean Agent, Halon, Dry and Wet Chemical, etc.), shall be monitored for fire, trouble and supervisory alarms by the main FACP.

2.14 SURGE PROTECTION MODULES

A. Provide surge protection for all FACP and FABP line-voltage circuits and SLC and NAC circuits.

B. The surge protection shall be Ditek Model DTK-120SR or SEPTA approved equivalent for FACP and FABP line voltage circuits.

The surge protection shall be a Ditek Model 2MHLP36B-WB module and base or equivalent for SLC’s and notification circuits.
C. Surge protector ground wires shall be run as straight as possible and have a minimum separation distance of 3 feet from FACPs and FSSCPs.
D. Surge protection shall be UL 497B Listed and be compatible with the FACP.
E. Surge protection shall be installed in accordance with Manufacturer's installation instructions.
F. Wire connections shall utilize screw terminal connections.

2.15 RELAY MODULE
A. Relay Module shall be Silent Knight Model SD500-ARM or SEPTA approved equivalent.
B. Relay Module shall be UL Listed and FM approved with the main FACP.
C. Relay Module shall be mounted in a 4-inch square box within three (3) feet of connected equipment.

2.16 CONDUIT RACEWAY AND WIRING
A. Conduit and Raceway
   1. Fire Detection and Alarm System conduit shall be type RGS.
   2. Fire Detection and Alarm System conduit shall be a minimum trade size diameter of 3/4-inch.
   3. Fire Detection and Alarm System conduit shall be appropriately sized to allow for 25 percent expansion.
   4. Fire Detection and Alarm System wiring including AC power supply shall be in dedicated conduits.
   5. The distance between junction or pull boxes for the Fire Detection and Alarm System shall not exceed 100 feet.
   6. Surface mounted, gasketed cast waterproof boxes and galvanized steel back boxes with "stand-offs" shall be utilized.
B. Wiring
   1. Power supply wiring shall be as shown on the Contract Drawings. Minimum conductor size shall be 12 AWG.
   2. The Fire Detection and Alarm System circuits shall be Type Fire Alarm Power Limited Riser, low smoke, zero halogen cables where installed entirely in conduit.
   3. Initiating circuits shall be as shown on the Contract Drawings. Minimum conductor size shall be 16 AWG.
   4. Notification circuits shall be as shown on the Contract Drawings. Minimum conductor size shall be 12 AWG.
   5. Accessory circuits (SBUS) shall be as shown on the Contract Drawings. Minimum conductor size shall be 16 AWG.
2.17 FIRE DETECTION AND ALARM SYSTEM LABELING

A. Labels shall be provided for the Fire Detection and Alarm System cabinets, including power supply cabinets, battery cabinets and conduit, pull boxes, and junction boxes as “FIRE ALARM SYSTEM” as shown on the Contract Drawings.

B. High-quality labels with adhesive backing (peel-off type) shall be waterproof.

C. A label shall be installed on the outside of the cabinet door containing the FAAP as shown on the Contract Drawings.

D. Junction box labels shall be octagon shaped and measure 3 inches across as shown on the Contract Drawings.

E. Conduit shall be labeled at a minimum of every 20 feet, with shorter lengths of conduit between connections boxes labeled at the midway point.

F. Conduit labels shall be rectangular shaped and measure 3/4 inches wide by 5-1/2 inches long as shown on the Contract Drawings.

G. Conduit shall be labeled at the following locations:
   1. At changes in direction.
   2. At each point of exit and entry where conduit passes through walls, floors or ceilings.
   3. Every 20 feet on a straight run.

H. Labels shall be provided above each pull station as shown on the Contract Drawings.

I. Addressable devices and notification appliances shall be identified by means of a waterproof self-adhering machine generated label (P-Touch style). The labels shall indicate device identifier as specified on plans.
   1. Addressable device identifier shall include SLC number and device address
   2. Notification appliance identifier shall include NAC or PSNAC number and the sequential device number on that circuit, beginning electrically nearest to the FACP or FAPS and continuing to the last device at the EOL.

J. Devices that contain End of Line Resistors shall also be labeled “EOL”.

K. Wires shall be tagged with permanent, factory-numbered wire markers which correspond to circuit number of device. Markers shall indicate both individual circuit number and device to which it is connected.

L. Wires shall be color-coded.

M. Wire tags shall be of high quality and equal to the 3M ScotchCode Wire Marking Tape.

N. Wires shall be tagged in disconnects, junction boxes, pull boxes, panels, terminal blocks and in general, wherever wire terminates or originates.
O. Wires shall be tagged with same number throughout its entire length.

P. All device labels must be placed in a visible location on the device and the device base that allows for easy visual inspection from the ground without the use of a personnel lifting device. If a label on the device back box is not visible from the ground without the use of a personnel lifting device, then install an additional device tag on the device and made visible from the ground without use of any personnel lifting device.

Q. Refer to Section 16075, Electrical Identification.

PART 3 – EXECUTION

3.01 EQUIPMENT INSTALLATION

A. Contractor shall coordinate with the SEPTA Project Manager prior to performing any Work that may affect the existing Fire Detection and Alarm System.

B. Contractor shall protect the existing and new Fire Detection and Alarm devices from damage, dust and false alarms during Work. Any active devices covered to protect from dust shall be uncovered at the end of the workday.

C. Contractor shall cover manual pull stations with a protective canvas cover upon initial installation to prevent attempted activation to a non-active system. The Contractor shall remove and properly dispose of the covers upon system acceptance at each station.

D. Contractor shall be responsible for damages to existing and new Fire Detection and Alarm Systems caused by the Contractor or the Contractor’s representatives.

E. Contractor shall provide one NICET Level III Certified person that shall be responsible for the following:

1. Examination of the design specifications and drawings to ensure specifications are met.
2. Supervision of Electrical and Fire Alarm installation personnel.
3. Final location of cabinets and devices and other Fire Alarm System equipment.
4. As-Built Shop Drawings.
5. Complete Fire Detection and Alarm System installation to ensure specifications are met.
6. Programming of FACPs.

F. Mounting height of manual fire pull stations and horn/strobe units shall be ADA Compliant.
G. All device installations shall be readily accessible for periodic maintenance as defined in NFPA 70. A ladder may be used for access. Devices shall not be placed directly over electrical equipment. The Contractor shall ensure that other installed items (e.g. conduits, etc.) do not restrict accessibility. Final device locations shall be approved by SEPTA.

H. The fire, trouble, and supervisory signals from the FM-200 FSSCP shall be separate points for each type of signal from each suppression panel, as shown on the Contract Drawings.

3.02 SEQUENCE OF OPERATION

A. Upon the activation of the following devices the operations are required in the order listed within the time period permitted by code.

1. Smoke Detector, Heat Detector and Manual Fire Pull Station Activation
   a. Local station FACP shall indicate an audible/visual fire alarm condition.
   b. Remote FAAP shall indicate an audible/visual fire alarm condition.
   c. All notification appliances shall activate.
   d. Life safety functions activated by associated relays shall operate.
   e. Central Station shall receive alarm or trouble condition, station location, zone and description.
   f. SEPTA shall receive alarm or trouble condition, station location, zone and description by the Central Station.
   g. Upon silencing of system, visual notification shall continue until system is reset.

2. Sprinkler Flow Switch Activation
   a. Local station FACP shall indicate an audible/visual fire alarm condition.
   b. Remote FAAP shall indicate an audible/visual fire alarm condition.
   c. All notification appliances shall activate.
   d. Life safety functions activated by associated relays shall operate.
   e. Central Station shall receive alarm or trouble condition, station location, zone and description.
   f. SEPTA shall receive alarm or trouble condition, station location, zone and description by the Central Station.
   g. Upon silencing of system, visual notification shall continue until system is reset.

3. Sprinkler Tamper Switch Activation
   a. Local station FACP shall indicate an audible/visual supervisory alarm condition.
b. Remote FAAP shall indicate an audible/visual supervisory alarm condition.

c. Central Station shall receive a supervisory condition, station location, zone and description.

d. SEPTA shall receive supervisory condition, station location, zone and description by the Central Station.

3.03 FIRE DETECTION AND ALARM SYSTEM TESTS AND RESULTS

A. Upon completion of Fire Detection and Alarm System installation with the exception of Central Station monitoring, perform complete inspection and pretesting. Determine conformance to requirements of the Specification and the Owner’s Requirements and correct deficiencies observed.

B. Replace malfunctioning or damaged devices with new and retest until specified performance and conditions are achieved.

C. Develop an Acceptance Test Plan in accordance with NFPA 72 – 2016 Edition, Chapter 10, with steps that will record results and SEPTA personnel initials prior to the acceptance test. The Test Plan shall test the Fire Detection and Alarm System complete including, but not limited to, the following:

1. Fire Alarm Control Panel
   a. Measure and record resistance of each circuit. Verify that circuit resistance does not exceed Manufacturer’s specified limits.
   b. Disconnect secondary power and test under maximum load for 5 minutes.
   c. Disconnect primary power supply and verify that trouble indication occurs.
   d. Measure and record standby current and calculate whether batteries are adequate to meet standby requirements.

2. Manual Fire Alarm Pull Station
   a. Pull stations shall be tested individually to ensure proper sequence of operation and location.

3. Smoke Detectors
   a. Individually test and record each detector to assure proper sequence of operations and correct location description.
   b. Individually test and record each detector’s sensitivity to insure it is at the factory setting.

4. Fire Sprinkler Flow Switches
   a. Test shall be conducted with water flow. Verify and record that flow switch activates FACP within 60 seconds of opening valve.

5. Supervisory Signal Initiating Devices
a. Operate valves and pressure switches and verify proper sequences.

6. Notification Appliances
   a. Put system into alarm and verify operation.
   b. Record ambient and alarm levels decibel level for each room or space of the facility.
   c. The reading levels shall be recorded on station plans.
   d. The reading levels shall also be recorded on the City Certificate of Inspection.

7. Fire/Smoke Damper
   a. Verify and record that each damper fully opens and fully closes via automatic and manual activation from FACP.

8. Air Handling Units
   a. Verify and record that each AHU shuts down upon the activation of a duct smoke detector.

9. Elevator Recall
   a. Verify and record that each elevator recalls to the egress level upon automatic and manual activation from the FACP.

D. Acceptance Testing
   1. Submit the Acceptance Test Plan to the SEPTA Project Manager for approval prior to Acceptance Testing.
   2. Notify the SEPTA Project Manager in writing with the date, time, and location of each Fire Detection and Alarm System testing at least two (2) weeks prior to each test, such that the SEPTA Project Manager or his authorized representative, SEPTA personnel and the Station Fire Marshall may witness the test.

E. Within one week of test completion, submit completed NFPA 72 Record of Completion to the SEPTA Project Manager for approval.

3.04 TRAINING
   A. Contractor shall provide formal training to SEPTA personnel.
   B. Fire Detection and Alarm System Manual shall be used for training.

3.05 OVERVIEW BRIEFING
   A. At the time the Fire Detection and Alarm System is ready for acceptance, the Contractor shall provide an Overview Briefing to SEPTA management at a mutually agreed time.
   B. This briefing will include a “walk-through” of the system to physically view the system devices and an activation of the Fire Alarm.
C. The location of the initial part of this briefing shall be at SEPTA’s Headquarters located at 1234 Market Street.

D. The Contractor shall supply SEPTA the below items and documentation. All of the items shall be formally and professionally submitted to SEPTA. Further, all items requiring signature shall contain the printed or typed signature block of the signatory.

1. Record documents per Section 01720, Project As-Built Documents.
2. Installing Contractor’s Certificate of Completion stating that the system has been installed in accordance with approved plans and tested in accordance with the manufacturer’s specifications and the appropriate NFPA requirements.
3. A “Record of Completion” as defined in NFPA 72.
4. A “Record of Alarm Inspection, Testing, and Certification.” This record shall include all applicable items contained in Chapter 10 of NFPA 72 plus include an audibility record that provides a record of ambient and alarm level dBA for each section, room, etc. of the facility.
5. Four (4) sets of programmed zone descriptions per station approved by SEPTA.
6. A copy of the Fire Alarm permit submittal and approval.
7. Four (4) full-size sets of the marked up contractor’s “As-Builts.” These “As-Builts” shall contain the same information as the Shop Drawings in Article 1.03.
8. Four (4) sets of each key to the Fire Detection and Alarm System.
10. Two (2) copies of the site-specific software used to program the system and site data and require peripheral equipment used to upload program information.
11. Two (2) copies of the electronic files that programs the FACP.
12. A completed City Certificate of Inspection after the Contractor programs the system to the Central Station monitoring service, and the certificate has been accepted by the City.
13. A CD containing all documents included in the binder and ACAD & PDF of the Field-Changes and As-Built drawings.

E. Upon satisfactory completion of the overview briefing and approval of the above provided items and documentation, the Contractor shall coordinate with SEPTA the exact date monitoring will start (monitoring shall not be effected prior to the above overview briefing).

F. Perform Central Station monitoring testing.
3.06 DEMOLITION OF EXISTING FIRE DETECTION AND ALARM SYSTEMS
   A. Demolition of existing Fire Detection and Alarm Systems may be initiated upon Central Station monitoring.
   B. Inspect new Fire Detection and Alarm System following demolition of existing Fire Detection and Alarm System.
   C. SEPTA reserves the right to claim any salvaged equipment and devices prior to disposal by the Contractor. Confirm equipment and device list with EMC Contract Services.

3.07 FIRE ALARM MONITORING CUTOVER
   A. Contractor shall be responsible for all payments to SEPTA’s fire alarm monitoring company (currently TycoIS) for the final installation (cut over) of this fire alarm system to their database.
   B. The Contractor shall be solely responsible for coordinating with TycoIS and confirming that their monitoring practices and protocols are compliant with the fire alarm system design and final installation.
   C. SEPTA Project Manager shall be responsible for coordinating the installation with the current fire alarm monitoring company (TycoIS).

3.08 ACCEPTANCE
   A. Acceptance will not take place until the following:
      1. Fire Detection and Alarm System is completely installed.
      2. Training has been provided.
      3. Documentation as contained in this Section is submitted and approved.
      4. Demolition is completed for existing Fire Detection and Alarm Systems.
      5. FACP is in normal standby condition following Demolition.
      6. Fire Detection and Alarm System is free of dust and dirt.
      7. Detector dust covers are turned over to SEPTA.
   B. SEPTA acceptance of the Fire Detection and Alarm System shall include signoff from SEPTA and the Station Fire Marshall.
   C. The Contractor shall be responsible for maintenance and response to alarms until the newly installed Fire Detection and Alarm System responsibility is turned over to SEPTA.
   D. Once acceptance takes place, the Contractor is not allowed to perform any Fire Detection and Alarm System installation, service, connection, etc. without the specified approval of SEPTA.

END OF SECTION 13852
SECTION 13900

FIRE SUPPRESSION

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section includes fire-suppression sprinklers, piping, and equipment for the following building systems:
   1. All fire-suppression system in trash rooms, elevator machine rooms, and elevator pits, including piping, valves, specialties, and automatic sprinklers.
   2. Dry standpipe system at the platforms and concourse levels.

1.02 RELATED SECTIONS

A. Division 1 - General Requirements
B. Section 02200 - Earthwork
C. Section 13852 - Addressable Fire Alarm System
D. Section 15010 - Basic Mechanical Requirements
E. Section 15050 - Basic Mechanical Materials and Methods
F. Section 15060 - Hangers and Supports
G. Division 16 - Electrical

1.03 SUBMITTALS

A. Product Data: For the following:
   1. Pipe and fitting materials and methods of joining for sprinkler piping.
   2. Valves, including specialty valves, accessories, and devices.
   3. Alarm devices. Include electrical data.
   4. Fire department connections. Include type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
   5. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
   6. Wall hydrant connection: Include type, number, size and arrangement of outlet.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, if applicable.

D. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

E. Maintenance Data: For each type of sprinkler specialty to include in maintenance manuals specified in Division 1.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.

B. Manufacturer Qualifications: Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.

C. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

E. NFPA Standards: Equipment, specialties, accessories, installation, and testing complying with the following:

1.05 DEFINITIONS

A. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 for obtaining approval from authorities having jurisdiction.

1.06 SYSTEM PERFORMANCE REQUIREMENTS

A. Design sprinklers and obtain approval from authorities having jurisdiction.

B. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:
   1. Include losses through water-service piping, valves, and backflow preventers.
2. The following types of Sprinkler Occupancy Hazard Classifications are included. Classifications for specific areas are as shown on Contract Plans.
   a. Ordinary Hazard, Group 1.
   b. Ordinary Hazard, Group 2.

3. Minimum Density for Automatic-Sprinkler Piping Design: As follows:
   a. Ordinary Hazard, Group 1 Occupancy: 0.15 gpm/ft$^2$ over 1500 ft$^2$.
   b. Ordinary Hazard, Group 2 Occupancy: 0.20 gpm/ft$^2$ over 1500 ft$^2$.

C. Components and Installation: Capable of producing piping systems with 175 psi minimum working-pressure rating, unless otherwise indicated.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. Specialty Valves and Devices:
   a. Grinnell Corp.
   b. Reliable Automatic Sprinkler Co., Inc.
   c. Viking Corp.
   d. Or Approved Equal.

2. Water-Flow Indicators and Supervisory Switches:
   a. Grinnell Corp.
   b. Reliable Automatic Sprinkler Co., Inc.
   c. Viking Corp.
   d. Or Approved Equal.

3. Sprinkler, Drain and Alarm Test Fittings:
a. Fire-End and Croker Corp.
b. Grinnell Corp.
c. Victaulic Co. of America.
d. Or Approved Equal.

4. Sprinkler, Branch-Line Test Fittings:
   b. Fire-End and Croker Corp.
   d. Or Approved Equal.

5. Sprinkler, Inspector's Test Fittings:
   a. Fire-End and Croker Corp.
   b. G/J Innovations, Inc.
   c. Triple R Specialty of Ajax, Inc.
   d. Or Approved Equal.

6. Fire Department Connections:
   b. Fire-End and Croker Corp.
   c. Grinnell Corp.
   d. Or Approved Equal.

7. Wall Hydrant Connections:
   b. Badger-Powhatan, A Figgie International Co.
   c. Grinnell Corp.
   d. Or Approved Equal.

8. Sprinklers:
   a. Grinnell Corp.
   b. Reliable Automatic Sprinkler Co., Inc.
   c. Viking Corp.
   d. Or Approved Equal.

9. Indicator Posts and Indicator-Post, Gate Valves:
   a. Grinnell Corp.
   b. Nibco, Inc.
   c. Stockham Valves & Fittings, Inc.
   d. Or Approved Equal.
10. Indicator Valves:
   a. Grinnell Corp.
   b. Nibco, Inc.
   c. Victaulic Co. of America.
   d. Or Approved Equal.

11. Fire-Protection-Service Valves:
   a. Grinnell Corp.
   b. Stockham Valves & Fittings, Inc.
   c. Victaulic Co. of America.
   d. Or Approved Equal.

12. Keyed Couplings for Steel Piping:
   a. Grinnell Corp.
   b. Victaulic Co. of America.
   c. Or Approved Equal

2.02 PIPING MATERIALS
   A. Refer to Part 3 “Piping Applications” Article for applications of pipe, tube,
      fitting, and joining materials.

2.03 PIPES AND TUBES
   A. Standard-Weight Steel Pipe: ASTM A 53 or ASTM A 135; Schedule 40,
      galvanized for all pipe and drain pipe systems.

2.04 PIPE AND TUBE FITTINGS
   A. Steel, Threaded Couplings: ASTM A 865.
   B. Provide hot dipped ASTM A-123 galvanized fittings and couplings for all
      systems and drain systems.

2.05 JOINING MATERIALS
   A. Refer to Section 15050 - Basic Mechanical Materials and Methods, for pipe-
      flange gasket materials and welding filler metals.
   B. Transition Couplings: AWWA C219, sleeve type, or other manufactured
      fitting the same size as, with pressure rating at least equal to, and with ends
      compatible with piping to be joined.

2.06 FIRE-PROTECTION-SERVICE VALVES
   A. General: UL listed and FM approved, with minimum 175 psi non-shock
      working-pressure rating. Valves for grooved-end piping may be furnished
      with grooved ends instead of type of ends specified.
B. Gate Valves, 2 in and smaller: UL 262; cast-bronze, threaded ends; solid wedge; OS&Y; and rising stem.

C. Gate Valves, 2.5 in and larger: UL 262, iron body, bronze mounted, taper wedge, OS&Y, and rising stem. Include replaceable, bronze, wedge facing rings and flanged ends.

D. Indicating Valves, 2.5 in and smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
   1. Indicator: Electrical 115-V ac, prewired, single-circuit, supervisory switch.

E. Indicator-Post, Gate Valves: UL 262, iron body, bronze mounted, solid-wedge disc, and nonrising stem with operating nut and flanged ends.

F. Indicator Posts: UL 789, horizontal, wall type, cast-iron body, with windows for target plates that indicate valve position, extension rod and coupling, locking device, and red enamel finish.

G. Swing Check Valves, 2 in and smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.

H. Swing Check Valves, 2.5 in and larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.

I. Split-Clapper Check Valves, 4 in and larger: UL 312, cast-iron body with rubber seal, bronze-alloy discs, and stainless-steel spring and hinge pin.

J. Backflow Preventer: Double check valve backflow preventer, Watts model 709 OS&Y or approved equal.

K. ALL valves must be capable of being chained and locked.

L. All valves associated with the installed sprinkler system must be chained and locked utilizing SEPTA padlock (ABUS No. 83AL/45) at the Contractor's expense.

2.07 SPECIALTY VALVES

A. Dry Pipe Valve: UL 193, 175 psi working pressure, designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, accelerator, and fill-line attachment with strainer.
   1. Option: Grooved-end connections for use with keyed couplings.
      a. Drip Cup Assembly: Pipe drain without valves, and separate from main drain piping.
2.08 SPRINKLERS
A. Automatic Sprinklers: With heat-responsive element complying with the following:
   1. UL 199, for applications except residential.
B. Sprinkler Types and Categories: Nominal 0.5 in orifice for “Ordinary” temperature classification rating, unless otherwise indicated or required by application.
C. Sprinkler types, features, and options include the following:
   1. Pendent, dry-type sprinklers.
   2. Upright sprinklers.
D. Sprinkler Finishes: Chrome-plated, bronze, and painted.
E. Special Coatings: Wax, lead, and corrosion-resistant paint.
F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
   1. Ceiling Mounting: Chrome-plated steel, two piece, with 1 in. vertical adjustment.
   2. Sidewall Mounting: Plastic, white finish, one piece, flat.
G. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.09 SPECIALTY SPRINKLER FITTINGS
A. Specialty Fittings: UL listed and FM approved; made of steel, or other materials compatible with piping.
B. Dry Pipe System Fittings: UL listed for wet pipe service.
C. Sprinkler, Drain and Alarm Test Fittings: UL-listed, with threaded inlet and outlet, test valve, and orifice and sight glass.
D. Sprinkler, Branch-Line Test Fittings: UL-listed, with threaded inlet and capped drain outlet and threaded outlet for sprinkler.
E. Sprinkler, Inspector's Test Fittings: UL-listed, with threaded inlet and drain outlet and sight glass.

2.10 FIRE DEPARTMENT CONNECTIONS
A. Description: UL 405; cast-brass body with brass, wall, escutcheon plate; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, outlet with pipe threads, extension pipe nipples, check devices or clappers for inlets and escutcheon plate.
1. Type: Exposed, projecting mounting per City of Philadelphia Fire Department.
2. Escutcheon Plate: Round with marking “FIRE SPRINKLER.”.

2.11 DRY STANDPIPE CONNECTION
   A. Description: Cast brass body with brass, wall, escutcheon plates; brass, lugged caps with gaskets and brass chains; and brass, lugged swivel connections. Include outlets with threads according to NFPA 1963 and matching local fire department sizes and threads, inlet with pipe threads, extension pipe nipple, and valve control.
   1. Type: Flush mounting.
   2. Escutcheon Plate: Round with markings “DRY STANDPIPE”.

2.12 ALARM DEVICES
   A. General: Types matching piping and equipment connections.
   B. Pressure Switches: UL 753; electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
   C. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
   D. Indicator-Post Supervisory Switches: UL 753; electrical; single-pole, double throw, with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.

2.13 PRESSURE GAGES
   A. Pressure Gages: UL 393, 3.5 in to 4.5 in diameter dial with dial range of 0 to 250 psig.

2.14 HANGERS AND SUPPORTS
   A. Provide hangers in accordance with the drawings and NFPA 13.

PART 3 – EXECUTION

3.01 PREPARATION
   A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in “Quality Assurance” Article in Part 1 of this Section.
B. Report test results promptly and in writing.

3.02 EARTHWORK
A. Refer to Section 02200 - Earthwork, for excavating, trenching and backfilling.

3.03 PIPING APPLICATIONS
A. Do not use welded joints with galvanized steel pipe.
B. Flanges, unions, and transition and special fittings with pressure ratings the same as or higher than system’s pressure rating may be used in aboveground applications, unless otherwise indicated.
C. Piping between Fire Department Connections and Check Valves: Use galvanized, standard-weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
D. Underground Service-Entrance Piping: Use ductile-iron, grooved-end pipe and fittings; ductile-iron, keyed couplings; and grooved joints.
E. Sprinkler Feed Mains and Risers: Use the following:
   1. Up to 6 in: Galvanized standard weight steel pipe with grooved ends; steel, grooved-end fittings; steel, keyed couplings, and grooved joints.

3.04 VALVE APPLICATIONS
A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   1. Fire-Protection-Service Valves: UL listed and FM approved for applications where required by NFPA 13.
      a. Shutoff Duty: Use OS&Y gate valves with tamper switch or ball valves with integral tamper switch.
   2. General-Duty Valves: For applications where UL-listed and FM-approved valves are not required by NFPA 13.
      a. Shutoff Duty: Use gate, ball, or butterfly valves.

3.05 JOINT CONSTRUCTION
A. Refer to Section 15050 - Basic Mechanical Materials and Methods, for basic piping joint construction.
B. Steel-Piping, Grooved Joints: For piping 2 in. to 6 in. use galvanized Schedule 40 steel pipe with cut or roll-grooved ends; steel, grooved-end fittings; and steel, keyed couplings. Assemble joints with couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions. Use gaskets listed for dry-pipe service for dry piping.
3.06 SERVICE-ENTRANCE PIPING
A. Connect sprinkler piping to water-service piping of size and in location indicated for service entrance to building. Refer to Section 02665 - Water Distribution System, for exterior piping.
B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories at connection to water service.

3.07 PIPING INSTALLATION
A. Refer to Section 15050 - Basic Mechanical Materials and Methods, for basic piping installation.
B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
   1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.
C. Install underground service-entrance piping according to NFPA 24 and with restrained joints.
D. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
E. Install unions adjacent to each valve in pipes 2 in and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
F. Install flanges or flange adapters on valves, apparatus, and equipment having 2 ½ in and larger connections.
G. Install “Inspector's Test Connections” in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
H. Install sprinkler piping with drains for complete system drainage.
I. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to sprinkler risers when sprinkler branch piping is connected to sprinkler risers.
J. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
K. Install alarm devices in piping systems.
L. Hangers and Supports: Comply with NFPA 13 and Section 15060, Hangers and Supports for hanger materials and installation.
M. Install piping with grooved joints according to manufacturer's written instructions. Construct rigid piping joints, unless otherwise indicated.
N. Install pressure gages on riser or feed main and at each sprinkler test connection. Include pressure gages with connection not less than 8 mm and with soft metal seated globe valve, arranged for draining pipe between gage
and valve. Install gages to permit removal, and install where they will not be subject to freezing.

O. Test valves must be piped to a SEPTA approved working floor drain or track area.

3.08 SPECIALTY SPRINKLER FITTING INSTALLATION
A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.09 VALVE INSTALLATION
A. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.
B. Install check valve in each water-supply connection.
C. Alarm Check Valves: Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain-line connection.

3.10 SPRINKLER APPLICATIONS
A. General: Use sprinklers according to the following applications:
   1. Trash Rooms without Ceilings: Pendant Dry-type sprinklers, as indicated.
   2. Rooms with Suspended Ceilings: Recessed sprinklers.
   4. Sprinkler Finishes: Use sprinklers with the following finishes:
      a. Upright and Pendent: Chrome-plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

3.11 SPRINKLER INSTALLATION
A. Install sprinklers in patterns indicated.
B. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical panels.

3.12 CONNECTIONS
A. Connect water supplies to sprinklers.
B. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
C. Connect piping to specialty valves, specialties, fire department connections, and accessories.
D. Electrical Connections: Power wiring is specified in Division 16.
E. Connect alarm devices to fire alarm.

3.13 LABELING AND IDENTIFICATION
A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and in Section 15050 - Basic Mechanical Materials and Methods.

3.14 FIELD QUALITY CONTROL
A. Flush, test, and inspect sprinkler piping according to NFPA 13, “System Acceptance” Chapter.
B. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.15 CLEANING
A. Clean dirt and debris from sprinklers.
B. Remove and replace sprinklers having paint other than factory finish.

3.16 PROTECTION
A. Protect sprinklers from damage until Substantial Completion.

3.17 COMMISSIONING
A. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
B. Verify that specified tests of piping are complete.
C. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
D. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
E. Verify that fire department connections have threads compatible with local fire department equipment.
F. Energize circuits to electrical equipment and devices.
G. Coordinate with fire alarm tests. Operate as required.

END OF SECTION 13900
SECTION 13967

CLEAN AGENT FIRE-EXTINGUISHING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the City, Standard Contract Requirements, Supplements to the City Standard Contract Requirements, Special Provisions and other Division 1 through 16 Specification Sections, apply to this Section.

B. Related Sections include the following:
   1. Division 13 Section 13852 – Fire Detection and Alarm System.
   2. Division 13 Section 13900 - Fire Suppression.

1.02 SUMMARY

A. This Section includes clean-agent extinguishing systems and the following:
   1. Piping and piping specialties.
   2. Extinguishing-agent containers.
   3. Extinguishing agent.
   5. Control and alarm panels.
   6. Air system dampers, controls and wiring
   7. Accessories.
   8. Connection devices for and wiring between system components.
   9. Connection devices for power and integration into building’s fire alarm system.
1.03 **DEFINITIONS**

A. HFC 227ea fire extinguishing clean agent. The trade names for this agent are FM-200 and FE-227.

1.04 **SYSTEM DESCRIPTION**

A. Description: Engineered system for discharge and total flooding of hazard areas with "HFC-227ea" known as “FM-200”, made by Great Lakes Chemical Corporation or FE-227 made by DuPont.

1.05 **PERFORMANCE REQUIREMENTS**

A. Design clean-agent extinguishing system and obtain approval from authorities having jurisdiction. Design system for Class A, B, or C fires as appropriate for areas being protected and include safety factor. Use clean agent indicated and in concentration suitable for normally occupied areas.

B. Performance Requirements: Discharge agent within 10 seconds and maintain 7.1 percent concentration by volume at 70 deg F for 10-minute holding time in hazard areas.

1. Agent concentration in hazard areas greater than 9.0 percent immediately after discharge or less than 7.0 percent throughout holding time will not be accepted without written authorization from Owner and authorities having jurisdiction.

2. System Capabilities: Minimum 620-psig calculated working pressure and 360-psig initial charging pressure.

C. Verified Detection: Include devices located in single zone. Sound alarm on activating single-detection device, and discharge extinguishing agent on actuating second-detection device.

D. System Operating Sequence: As follows:

   1. Actuating First Detector: Give visual indication on annunciator panel, energize audible alarm, shut down air-conditioning and ventilating systems serving protected area, release and close doors in protected area, and send signal to fire alarm system.

   2. Actuating Second Detector: Give visual indication on enunciator panel, energize audible alarm, shut down power to protected equipment, actuate time delay for extinguishing-agent discharge for 30 seconds, and release extinguishing agent.

   3. Extinguishing-agent discharge will operate audible alarms and strobe lights.
E. Operating manual-release stations will discharge extinguishing agent when activated.

F. Operating abort switches will delay extinguishing-agent discharge while being activated, and switches must be reset to prevent agent discharge. Release of switch will discharge agent.

1.06 SUBMITTALS

A. Product Data: For the following:

1. Extinguishing-agent containers.
2. Extinguishing agent.
3. Discharge nozzles.
4. Control panel.
5. Detection devices.
7. Switches.
8. Alarm devices.
9. Air system dampers and controls.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Include design calculations. Include the following for hazard-area enclosure, drawn to scale:

1. Plans, elevations, sections, details, and attachments to other Work. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
3. Design Calculations: For weight, volume, and concentration of extinguishing agent required for each hazard area.
4. Reflected Ceiling Plans: Show ceiling-mounted items, and the following:
a. Extinguishing-agent containers, piping, discharge nozzles, detectors, and accessories.
b. Method of attaching hangers to building structure.
c. Other ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.

5. Occupied Work Area Plans: Show the following:
   a. Controls and alarms.
   b. Extinguishing-agent containers, piping and discharge nozzles if mounted in space, detectors, and accessories.
   c. Equipment and furnishings.

6. Access Floor Space Plans: Show the following:
   a. Extinguishing-agent containers, piping, discharge nozzles, detectors, and accessories.
   b. Method of supporting piping.

C. Permit Approved Drawings: Working plans, prepared according to NFPA 2001, 2012 Edition, that have been approved by authorities having jurisdiction. Include design calculations.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.07 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of clean-agent extinguishing systems that are similar to those indicated for this Project in material, design, and extent.

B. Source Limitations: Obtain extinguishing agent and equipment through one source.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of clean-agent extinguishing systems and are based on the specific system indicated. Other manufacturers' systems with equal performance characteristics may be considered. Contractor shall become responsible for submitting a new layout to the engineer for approval prior to purchasing any substitution equipment or accessories.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
E. ASME Compliance: Fabricate piping to comply with ASME B31.1, "Power Piping."

F. FM Compliance
   1. Provide components that are FM approved and are listed in FM's "Fire Protection Approval Guide."
   2. Installation and testing of system shall comply with the latest edition of FM Global Property Loss Prevention Data Sheet 4-9. Contractor shall conduct an enclosure integrity procedure (i.e., door fan test) of the protected area in accordance with NFPA 2001. A discharge test using inert gas systems for final acceptance by FM Global will not be required.


H. UL Compliance: Provide equipment components complying with UL 1058, "Halogenated Agent Extinguishing System Units," and are UL listed for clean-agent extinguishing system units in UL's "Fire Protection Equipment Directory."

I. Contractor Qualifications: Contractor shall have not less than 3 years successful experience in installation and testing of FM-200 systems. Installers shall be skilled in their designated tasks, and under the supervision of a trained foreman.
   1. Contractor shall submit certification statement indicating compliance with above.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Clean agent extinguishing system control panel shall be a Fike SHP Pro control panel or SEPTA approved equivalent.

B. All fire alarm control panels shall be UL listed for releasing.

C. Clean-Agent Tanks shall be Fike Corp.; Fire Protection Systems Div or SEPTA approved equivalent.

2.02 PIPING MATERIALS

A. Refer to Part 3 piping applications Article retained for applications of pipe, tube, fitting, and joining materials.
B. Piping, Valves, and Discharge Nozzles: Comply with types and standards listed in NFPA 2001, Section "Distribution," and Appendix A, for charging pressure of system.

2.03 PIPES AND TUBES

A. Black Steel Pipe: ASTM A 53, Type S, Grade A or ASTM A 106, Grade A; Schedule 40.

2.04 PIPE AND TUBE FITTINGS

A. Steel Flanges and Flanged Fittings: ASME B16.5, Class 300.

B. Steel, Grooved-End Fittings: FM approved and UL listed ASTM A 536 ductile iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.

2.05 JOINING MATERIALS

A. Steel, Keyed Couplings: UL 213, AWWA C606, approved or listed for clean-agent service, and matching steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gasket, and steel bolts and nuts.

2.06 VALVES

A. General: Brass; suitable for intended operation.

B. Container Valves: With rupture disc or solenoid, capable of immediate and total agent discharge and suitable for intended flow capacity.

C. Valves in Sections of Closed Piping and Manifolds: Fabricate to prevent entrapment of liquid, or install valve and separate pressure-relief device.

D. Valves in Manifolds: Check valve; installed to prevent loss of extinguishing agent when container is removed from manifold.

2.07 EXTINGUISHING-AGENT CONTAINERS

A. Description: Steel tanks complying with ASME Boiler and Pressure Vessel Code: Section VIII, for unfired pressure vessels. Include minimum working-pressure rating that matches system charging pressure, valve, pressure switch, and pressure gage.

1. Finish: Manufacturer's standard color, enamel or epoxy paint.

2. Manifold: Fabricate with valves, pressure switches, selector switch, and connections for main- banks of multiple storage containers.
3. Storage-Tank Brackets: Factory fabricated retaining brackets consisting of steel straps and channels; suitable for container support, maintenance, and tank refilling or replacement.

2.08 FIRE-EXTINGUISHING CLEAN AGENT

A. Clean Agent: FM-200.

B. Clean Agent: FE-227.

2.09 DISCHARGE NOZZLES

A. Equipment manufacturer's standard one-piece brass or aluminum alloy of type, discharge pattern, and capacity required for application.

2.10 CONTROL PANELS

A. Description: UL listed/FM approved, including equipment and features required for testing, supervising, and operating fire-extinguishing system.

B. Power Requirements: 120V ac; with electrical contacts for connection to system components and fire alarm system, and transformer or rectifier as needed to produce power at voltage required for accessories and alarm devices.

C. Enclosure: NEMA ICS 6, Type 1, surface-mounted enameled-steel cabinet.

D. Supervised Circuits: Separate circuits for each independent hazard area.

1. Provide the following verified-detection applications:
   a. Detection circuit.
   c. Alarm circuit.
   d. Release circuit.

2. Provide the following control-panel features:
   a. Electrical contacts for shutting down fans, activating dampers, and operating system electrical devices. Contacts shall be properly rated for controlled devices; additional relays and wiring required to keep contacts within their rating shall be provided at no additional cost.
   b. Automatic switchover to standby power at loss of primary power.
   c. Storage container, low-pressure indicator.

3. Standby Power: Lead-acid or nickel-cadmium batteries with capacity to operate system for 72 hours and alarm for minimum of
15 minutes. Include automatic battery charger, with varying charging rate between trickle and high depending on battery voltage, that is capable of maintaining batteries fully charged. Include manual voltage control, dc voltmeter, dc ammeter, electrical contacts for connection to control panel, and suitable enclosure.

2.11 DETECTION DEVICES

A. Description: Comply with current edition of NFPA 2001 and NFPA 72, and include the following types:

1. Ionization Detectors: UL 268, dual-chamber type, having sampling and referencing chambers, with smoke-sensing element.

2. Photoelectric Detectors: UL 268, consisting of LED light source and silicon photodiode receiving element.

2.12 MANUAL-RELEASE STATIONS

A. Description: UL listed/FM approved with “PULL STATION” caption, 120-V ac or low voltage compatible with controls. Include contacts for connection to control panel. Unit can manually discharge extinguishing agent with operating device that remains engaged until unlocked

B. Stations shall be manufactured from high impact red Lexan. Lettering shall be raised and painted white.

C. The front of the station is to be hinged to a backplate assembly and must be opened with a key to reset the station. The key shall be common with the control panels. Stations that use allen wrenches or special tools to reset, will not be accepted.

D. Pull stations shall be installed a maximum height of 44 inches above finished floor in all areas and where the location is wheelchair side accessible. Areas only accessible to front facing wheelchairs shall have the manual pull stations located a maximum of 42 inches above finished floor. All dimensions shall be centerline of the pull station.

2.13 SWITCHES

A. Description: FM approved or UL listed, where available, 120-V ac or low voltage compatible with controls. Include contacts for connection to control panel.

1. Abort Switches: Dead-man type, requiring constant pressure, for delay of system discharge.
2.14 ALARM DEVICES
   A. Description: FM approved or UL listed, low voltage, and surface mounting, unless otherwise indicated.
   B. Bells: Minimum 6-inch diameter.
   C. Horn/Stobes: UL listed/FM approved. Horn/strobe combination units shall be 65mA average at 24 VDC, 75 candela at 10 ft. 1 Hz flash rate conforming to ADA requirements and UL 1971 for strobes. Horn shall be 90 to 94 dBA.

2.15 ELECTRICAL POWER AND WIRING
   D. Electrical power, wiring, and devices are specified in Division 16 Sections.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Examine areas and conditions, with Installer present, for compliance with hazard-area leakage requirements, installation tolerances, and other conditions affecting work performance.
   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PIPING APPLICATIONS FOR 360-PSIG CHARGING PRESSURE
   A. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
   C. Flanged Joints: Class 300 minimum.
   D. NPS 2 and Smaller: Black steel pipe, malleable-iron threaded fittings, and threaded joints.
   E. NPS 2½ and larger: Black steel pipe; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.

3.03 CLEAN-AGENT EXTINGUISHING PIPING INSTALLATION
   A. Install clean-agent extinguishing piping and other components level and plumb and according to manufacturers' written instructions.
B. Grooved Piping Joints: Groove pipe ends according to AWWA C606 dimensions. Assemble grooved-end steel pipe and steel, grooved-end fittings with steel, keyed couplings and lubricant according to manufacturer's written instructions.

C. Install extinguishing-agent containers against the wall of the space on the floor or near the ceiling.

D. Install pipe and fittings, valves, and discharge nozzles according to requirements listed in NFPA 2001, Section "Distribution," and related Appendix A paragraphs; and ASME B31.1.
   1. Install valves designed to prevent entrapment of liquid or install pressure-relief devices in valved sections of piping systems.
   3. Install control panels, detection system components, alarms, and accessories, complying with requirements of NFPA 2001, Section "Detection, Actuation, and Control Systems," as required for supervised system application.

3.04 CONNECTIONS

A. Drawings identify the areas to be served by the systems. The following are specific connection requirements:

B. Install piping adjacent to extinguishing-agent containers to allow service and maintenance.

C. Connect electrical devices to control panel and to buildings fire alarm system. Electrical power, wiring, and devices are specified in Division 16 Section 16820 "Fire Alarm Systems."

D. Ground electrical components.
   1. 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 and UL 486B.
3.05 AIR SYSTEM DAMPERS AND EXISTING DUCT DISTRIBUTION SYSTEM

A. Modify existing ductwork as necessary to install new air system dampers and controls for shutdown of air distribution systems at locations indicated on drawing.

B. Insulate new sections of ductwork in accordance with manufacturer's written instructions.

C. Seal insulation joints and seams with vapor-retardant tape per manufacturer’s recommendation.

3.06 LABELING


3.07 FIELD QUALITY CONTROL

A. Professional Engineer: Inspect installed clean-agent extinguishing systems, prepare installation report, and certify that installation complies with the Contract Documents and calculations, and comments of authorities having jurisdiction.

B. Comply with operating instructions and procedures of the latest edition of NFPA 2001, Section "Approval of Installations." Include the following inspections and tests to demonstrate compliance with requirements:

1. Check mechanical items.
2. Inspect extinguishing-agent containers and extinguishing agent, and check mountings for adequate anchoring to substrate.
3. Check electrical systems.
5. Perform functional pre-discharge test.
7. Check remote monitoring operations.
8. Check control-panel primary power source.
9. Pneumatically test open-ended piping in a closed circuit for a period of 10 minutes at 40 PSIG. At the end of 10 minutes, the pressure drop should not exceed 20 percent of the test pressure.

10. Perform "puff" test on piping system, using nitrogen.

C. Perform field-acceptance tests of each clean-agent extinguishing system when installation is complete. Perform system testing only after hazard-area enclosure construction has been completed and openings sealed. Comply with operating instructions and procedures of NFPA 2001, Section "Approval of Installations." Include the following to demonstrate compliance with requirements:
   1. Perform functional pre-discharge test.
   2. Perform system functional operational test.
   3. Check remote monitoring operations.
   4. Check control-panel primary power source.
   5. Perform "puff" test on piping system, using nitrogen.

D. Correct malfunctioning equipment, and then retest to demonstrate compliance. Replace equipment that cannot be corrected or does not perform as specified and indicated, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
   1. Report test results promptly and in writing to Engineer and authorities having jurisdiction.

E. Perform the following field quality-control testing:
   1. After installing clean-agent extinguishing piping system and after electrical circuitry has been energized, test for compliance with requirements.
   2. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7, "Inspection and Test Procedures," and Section 8, "System Function Tests." Certify compliance with test parameters.

F. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment
installation, including piping and electrical connections. Report results in writing.

1. **Leak Test:** After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. **Operational Test:** After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

3. **Test and adjust controls and safeties.** Replace damaged and malfunctioning controls and equipment.

### 3.08 COMMISSIONING

A. Engage a factory-authorized service representative to perform startup service.

B. Verify that extinguishing system is installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with the Contract Documents.

D. Complete installation and startup checks according to manufacturer's written instructions and do the following:
   1. Verify that tests of piping system are complete.
   2. Check for complete enclosure integrity.
   3. Check operation of ventilation and exhaust systems.

E. **Startup Procedures:** Follow manufacturer's written procedures. If no procedures are prescribed by manufacturer, proceed as follows:
   1. Fill extinguishing-agent containers with extinguishing agent and pressurize to indicate charging pressure.
   2. Install filled extinguishing-agent containers.
   3. Energize circuits.
   4. Adjust operating controls.

### 3.09 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain system.
1. Train Owner’s maintenance personnel on procedures and schedules for troubleshooting, servicing, and maintaining equipment and schedules.

2. Schedule training with Owner, through Engineer, with at least seven days’ advance notice.

END OF SECTION 13967
SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for materials, equipment and installations necessary for complete and satisfactory performance of mechanical work specified in Sections of Division 15.

B. Related Sections:

1. The following sections prescribe items of related work:

   a. Section 01010: Summary of Project
   b. Section 01041: Project Coordination
   c. Section 01045: Cutting and Patching

1.02 REFERENCES

A. Philadelphia Plumbing Code

B. 2009 International Mechanical Code

C. American National Standards Institute:

   1. ANSI B31.2, Building Service Piping.

D. American Society For Testing and Materials:


E. Steel Structures Painting Council:

   1. Surface Preparation Specifications.

      a. SSPC-SP 2, Hand Tool Cleaning.
      b. SSPC-SP 6, Commercial Blast Cleaning.
      c. SSPC-SP 8, Pickling.

   2. Paint Application Specifications: SSPC-PA 1, Shop, Field and Maintenance Painting.
1.03 SUBMITTALS

A. Submissions Required: Submit in accordance with Section 01300, Shop Drawings for the mechanical materials and equipment covered in each Section of Division 15, and such items as may be scheduled on the Contract Drawings.

B. Content of Submissions:
   1. Include in shop drawings, manufacturer's descriptive literature and published details with performance/capacity rating schedules as applicable in submissions.
   2. Indicate fabrication details and proposed layouts for shop or field fabrications of piping systems.

C. Operation and Maintenance Manuals: Furnish in accordance with Section 01830 Operations and Maintenance Data.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: The construction requirements of State, County, or other political subdivision specifications exceeding the requirements of the codes, standards, and approving bodies referenced herein shall be met and complied with.

   1. Comply with requirements of the National Fire Protection Association Pamphlets (NFPA) referenced in the various Specifications Sections, and as directly appropriate to work and workmanship of this Contract.

B. Certificates and Permits: Upon completion of work, and prior to final payment, furnish formal certification of final inspections to SEPTA from authorities having jurisdiction and secure required Permits, if any, from same. Additionally, prepare detailed diagrams and drawings which may be required by those authorities having jurisdiction.

C. Source Quality Control: Products used throughout these specifications are those of companies having established reputations in the manufacture of the particular materials, equipment or apparatus specified. Such products shall be of their own make, or products of others, for which the manufacturer assumes full responsibility for products used in said outfits which are not manufactured completely by them; and with replacement parts available.

D. Products of Manufacturers: The mechanical materials shall be essentially the standard products of manufacturers who have been regularly engaged
in the successful production of high quality mechanical materials and equipment of this type for at least ten years, have supplied such mechanical materials and equipment for at least five years of the ten year period, and have at least five installations in successful operation for at least five years.

E. Workmen’s Qualifications: In acceptance or rejection of completed work, no allowance will be made for lack of skill on the part of the Contractor’s forces performing such work.

1. Provide certified pipe welder(s) capable of welding in accordance with ANSI B31.1, Power Piping (Pressure Piping). Show proof of certification when requested by SEPTA.

1.05 DELIVERY STORAGE AND HANDLING

A. Deliver, store and handle the mechanical materials and equipment in accordance with Section 01600, the manufacturer’s recommendations and as supplemented herein within each Section.

1.06 PROJECT CONDITIONS

A. Interferences:

1. Construct Mechanical Systems when and in a manner not to delay or interfere with other operations of work in the project.
2. Prior to making Mechanical installations, coordinate Mechanical Work locations with other operations of work, especially in congested areas, such as mechanical equipment rooms and above hung ceilings (if any).
3. In the event that interferences develop, SEPTA’s decision will be final and no additional compensation will be allowed for relocation of Mechanical products.

B. Basis of Design: The first named manufacturer’s product in the acceptable manufacturers list of each article of Section 15 is the basis of design.

1. Where the contractor proposes to use a product requiring a change in the contract drawings, the Contractor shall pay all costs for any modifications of the design including all re-engineering costs. Prior approval shall be obtained from SEPTA for any substitution.
2. Where a performance is specified and no manufacturer is listed, the Contractor shall submit through the shop drawing procedure the name of the manufacturer, the product proposed, and detailed
information showing its characteristics. SEPTA shall determine acceptance.

3. Where a choice of color, pattern, or texture is available for a specified product or item of equipment, SEPTA will make a selection from the manufacturer’s highest or best standards.

1.07 WARRANTIES

A. Assigned Warranties: Assign directly to SEPTA such manufacturer’s warranties on material and equipment (including internal components) as exceed the guarantee time period as stated in the Agreement.

1. Date such assigned warranties to begin on the date of the SEPTA’s acceptance of the Work.
2. Submit warranties along with the Operation and Maintenance Manual submission.
3. Submit warranties along with submission of Shop Drawings and Product Data.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Material particulars and requirements as specified in the various Sections included under Division 15 - Mechanical.

PART 3 – EXECUTION

3.01 INSTALLATIONS

A. General Requirements: Installation particulars and requirements are as specified in the various Sections included under Division 15 - Mechanical.

1. Perform required interconnection of the differing mechanical systems to the various mechanical equipment, devices, or apparatus, regardless of where such Products are specified throughout Division 15 - Mechanical, in order to ensure the completeness of such mechanical systems.
2. Install mechanical equipment level, unless indicated or directed otherwise.
3. General, Mechanical, and Plumbing Contractors are responsible for furnishing disconnects, fuses, starters, and overloads for equipment furnished under their contract. Electrical contractor is responsible to install those items.
B. Factory Finishes and Field Painting: Painting factory-finished items will be required in the cases where the factory finish is damaged. Such painting will be performed by this Contract, and as specified herein

1. Surface Preparation: This Contractor is responsible for the quality of the repaint work insofar as proper surface preparation will affect the finished appearance. The quality of the repaint work will be subject to the Project Manager’s approval.
   a. Perform surface preparation of damaged areas in conformance with the latest edition of the Steel Structures Painting Council Standard SSPC-SP2, Hand Tool Cleaning.
   b. Where a damaged area occurs on one surface of an item having several surfaces, that entire surface where the damage occurs shall require repainting. The surface preparation for outside the damaged area shall consist of a light sanding to profile the existing paint.

2. Paint Application: Apply paint in such a manner so that the finished appearance will match as nearly as possible the factory finish.
   a. Use paint material matching the composition of the factory applied products.
   b. Comply with the paint manufacturer’s label instruction for mixing, thinning, proper spreading rate, drying time, and environmental limitations concerning application.

3.02 FIELD QUALITY CONTROL

A. General: Perform cleaning, flushing, and testing operations as specified in the various Sections included under Division 15 - Mechanical.

1. Provide instruments, testing equipment, and such other required materials to perform the Field Quality Control Work.
   2. Correct all deficiencies to the satisfaction of SEPTA.

END OF SECTION 15010
SECTION 16710

NETWORK COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.01 STIPULATIONS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this and all related Division 16 specification sections.

B. Related Specification Sections:

1. In addition to the above requirements the following Specification Sections shall also apply to this Section:
   
   a. Division 16, Section “Basic Electrical Requirements.”
   b. Division 16, Section “Conductors and Cables.”
   c. Division 16, Section “Grounding and Bonding.”
   d. Division 16, Section “Hangers and Supports.”
   e. Division 16, Section “Raceways and Boxes.”
   f. Division 16, Section “Electrical Identification.”
   g. Division 16, Section “Common Work Results For Communications Systems”

C. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedules. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location.
   
   a. Contractor shall coordinate exact locations with all mechanical and electrical drawings as well as all affected trades prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Section 16700 for additional information.
2. 10base2 — 10 Mbps data throughput over coaxial wire medium.
3. 10baseT — 10 Mbps data throughput over twisted pair medium.
4. 10baseFl — 10 Mbps data throughput over fiber optic medium.
5. 100baseT — 100 Mbps data throughput over twisted pair medium.
6. 100baseFl — 100 Mbps data throughput over fiber optic medium.
7. ACR — Attenuation to Crosstalk Ratio.
9. AUI — Attachment Unit Interface.
10. CATV — Cable TV - Community Antenna Television.
11. CSU — Channel Service Unit.
12. dB — Decibel.
13. DSU — Data Service Unit.
14. ELFEXT — Equal Level Far End Crosstalk.
15. FEXT — Far End Crosstalk.
17. IR — Infrared.
18. Lab — Computer, Science and/or Education Laboratory.
19. Mbps — Megabits per second.
20. MDF — Main Distribution Frame.
22. NEXT — Near End Crosstalk.
24. PLC — Programmable Logic Controller

E. Definitions:

1. Refer to Specification Section 16700 for additional information.

1.02 SUMMARY

A. The intent of this specification is to establish a standard of quality, overall system configuration, and equipment requirements for the installation of a new TCP/IP premise network infrastructure and components as are required by the Contract documents. The contractor shall be responsible for providing all design, installation, programming, commissioning, testing, and certifications as necessary to provide complete infrastructure to support all TCP/IP premise cabling networks in accordance with the Contract Drawings and/or as herein specified.

1. The installation, performance, features, functions, software, and programming criteria as specified herein as well as all related specification sections have been designed to offer the maximum system efficiency ease of operation, occupant safety and the protection of equipment as recommended by the Owner’s Representative.

a. Any deviations from the specified criteria shall be documented, reviewed, and agreed to in writing by the Owner’s Representative prior to submission of bids. Refer to Division 01, all related Division 16 and Division 16 specification section for product substitutions.

2. It is the responsibility of the contractor to insure that the installed system meets or exceeds every standard set forth in these specifications. The contractor shall provide all communications cabling, active communications electronics, conduits, system components, termination components, racks/cabinets, electrical power, software, programming and all appurtenances as well as all necessary testing, commissioning and certifications as required to provide a complete and fully operational TCP/IP based premise network whether specifically included in this section or not.

B. The contractor shall furnish all labor, equipment, materials, testing, commissioning, programming, and certification for the installation of a complete premise network communications network system as indicated on the drawings and as herein specified.
a. The systems shall include at the minimum but not limited to the following:

1) Emergency Call Boxes
2) Category-6 cabling.
3) Fiber Optic Cabling (Network Backbone)
4) Conduit/Duct/Raceway Systems
5) Distribution/Termination Panels
6) Cashier Booth PLC

b. The systems shall at the minimum support the following communications protocols:

1) 100 Base TX, Fast Ethernet (IEEE802.3).
2) 1000 Base SX, Gigabit Ethernet (IEEE802.3).
3) 1000 Base –T, GigE over copper (IEEE802.3)
4) 1000 Base LX, Gigabit Ethernet (IEEE802.3).
5) 10 BASE-FL, 10 Mbit/s over Fiber (IEEE802.3)
6) Protocols:
   a) TCP/IP (RFC1720)-OSI Compliant

C. Communications Systems Design Requirements:

1. Provide a complete operational communications network infrastructure including but not limited to all cabling, active communications equipment, cabling distribution, and termination components as required to support the installation of all new premise network system.

   a. Horizontal data and telephone network connections shall utilize Category-6 copper cabling and hardware for distribution to all data and telecommunications infrastructure as indicated on the contract drawings. All horizontal cabling shall installed in dedicated cable trays sized to support the network cabling requirements and shall terminate on Category-6 patch panels in the main communications equipment room.

   b. All communications cabling shall be terminated at both ends of the basic link at all equipment locations.

      1) All data cabling shall utilize Category-6 and be terminated at both ends of the basic link at all data jacks, and category 6 patch panels.

      2) All telephone cabling shall utilize Category-6 and be terminated at both ends of the basic link at all Telephone jacks, telephone punch blocks and telephone patch panels.

      3) 110 Wiring Blocks and Wire Management Components shall be mounted on the equipment racks as indicated on the project drawings. Each device shall be mounted such that its horizontal dimension is level. In cases where more than one device is mounted, they shall be aligned vertically.

      4) All Fiber Optic Backbone cabling shall be a minimum of 24 strands Multi Mode (50/125 micron) and 24 strands Single Mode (8.3/125 micron) cable. All fiber optic terminations shall be provided with SC type connectors and shall be terminated at all communication room locations.

      5) All telephone exchange cables (copper backbone cables) shall be a
minimum of (2) 50 pair category 3 UTP cables and shall be terminated on 110 punch blocks at all communication room locations.

c. All communications rooms/closets shall be equipped with one (1) dedicated telecommunications grounding bus-bar. All equipment racks/cabinets, conduits, cable trays and cable shields shall be bonded to the grounding bus-bar.

d. Equipment racks/cabinets shall be assembled and mounted in locations as indicated on the contract drawings. Each rack/cabinet shall be assembled in accordance with the manufacturer’s instructions and recommendations.

1) Each rack/cabinet shall be mounted such that the side rails are plumb and shall be permanently affixed to the building floor/structure. Equipment rack/cabinet are to be co-located with vertical PDU outlets installed on each side at the rear racks/cabinets. All racks/cabinets shall be bonded to the appropriate grounding bus-bar in accordance with all project documents.

2) All racks/cabinets shall be provided 208/120 volt electrical power connected to the nearest electrical distribution power.

e. Where fiber or copper cable enters a communications room it shall be supported on horizontal or vertical cable tray. If terminations are on backboards then it should be supported from the raceway support to the backboard via "D" Rings and cable ties. All cable shall be neatly bundled, combed, and tied.

f. All cable bends shall comply with minimum specified cable bending radii. Copper UTP cable runs shall be provided with a ten-foot slack loop in the cable raceway, in each communications rooms. Space Category-6 cable in the raceway or cable trays to avoid heavy stressing of the cable due to its own weight. Provide sufficient slack in the run to avoid any cinching of cables.

2. The Contractor is responsible for the installation of all communications infrastructure: including all workmanship, standards of quality, adherence to the contract documents, certification testing, as-built documentation, labeling, and final warranty in relationship to the performance and installation of the structured cabling systems in accordance with the contract drawings and/or as herein specified.

3. The Electrical Contractor shall furnish and install the Emergency Call Box (ECB) System and provide all the necessary conduit and wiring for the system.

a. The SEPTA Emergency Call Box System is a digital logic controlled intercommunication system which allows station patrons to summon assistance through a system operator at SEPTA headquarters.

b. All of the remote units are connected via existing private telephone lines to the master control unit at SEPTA headquarters. Once a button is pressed on a remote unit, a flashing red light indicates the location of the caller. The light will continue to flash, and an audible alarm will sound until the call is answered.

1) Call Boxes shall be VPP 2100 Series.

2) Note: Refer to approved SEPTA Contract Drawings for specific quantity, location and type of equipment. VPP Contact information: Jonathan Latham, 1-800-527-9156, ext.256.

D. Backbone Performance Requirements:
1. The intended function of the communications network is to transmit data communications signals from a central location to several individual data and telecommunications drop locations. Upon completion of the work in accordance with the contract documents, the system shall be capable of transmitting data signals at a rate of 1000 Mbps minimum over Category-6 cable and a minimum of 10Gbps over single mode fiber optic cables based upon the transmitting distance, laser attenuation, and number of links.

   a. The 50/125 micron multi-mode optical fiber cable shall be capable of transmitting signals with a minimum modal bandwidth of 500 MHz-km at both 850 and 1300 nm (i.e. 500/500) providing a nominal 600 meters @ 1GBPS and 82 meters @ 10GBPS.

   b. The single-mode 8.3/125 micron (nominal) optical fiber cable shall be capable of transmitting signals at both 1310 and 1550 nm capable of providing a nominal 5km @ 1GBPS @1000 Base LX and nominal 10km @ 10GBPS @10GBASE-LX4 transmission rates.

2. Note: The Contractor must certify in writing that the structured cabling system(s) are installed in accordance to the project documents, the referenced standards, manufacturer requirements.

   a. In addition, the contractor shall provide in writing all extended manufacturers’ warranties for matching compatibility of the structured cabling system as well as all as-built drawings and field test reports for both the fiber and copper cabling systems before the Owner’s Representative will accept the installation.

E. The contractor and all sub-contractors for this work shall have read all of the General Conditions, Special Requirements, General Requirements, and all applicable related specification sections and in the execution of all work shall be bound by all of the conditions and requirements therein.

F. Prior to the submission of the Bid, any discrepancies or inconsistencies noted within these specifications and/or the project drawings shall be brought to the immediate attention of the Owner’s Representative.

   1. Project specifications and drawings may not deal individually with every component, control, device, or appurtenance, which may be required to produce the specified system configuration, and/or as necessary to meet the equipment and cabling requirements. Coordinate all integration requirements with the Owner’s Representative and all appropriate systems providers.

   2. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. The contractor shall coordinate the installation of all cabling, materials, equipment, devices, and conduits with all affected manufacturers and document all coordination at the time of shop drawing submittals.

G. This contractor shall assume total responsibility for coordinating all inter-building wiring, any common carrier provided network equipment, and/or Owner provided equipment as it relates to the operation of these systems.
1.03 REFERENCE STANDARDS
   A. Refer to Specification Section 16700 for additional information.

1.04 SUBMITTALS
   A. Refer to Specification Section 16700 for additional information.

1.05 RECORD DOCUMENTS
   A. Provide Owner with complete set of record drawings in accordance with the requirements of section 16700.

1.07 EXTRA MATERIAL
   A. NOT USED

PART 2 – PRODUCTS

2.01 GENERAL
   A. Unless specified otherwise, the equipment furnished shall fall into six classes, and with the exception of Class 6, all of the material within a single class shall be the standard product of one manufacturer. Exceptions are annotated (Class Exempt). The six classes are as follows:

   1. CLASS ONE: Fiber Optic Cable, Category-6, and Category-3 UTP copper cable (both station and backbone), fiber optic jumpers, Category-6 patch cords, blocking kits, interconnection devices, connectors (fiber and copper), wiring blocks, patch panels, and telecommunications outlets. Refer to applicable specification paragraphs for acceptable product manufacturers.

   a. Note: All material covered in “Class One” shall conform to all manufacturers’ cable/component matching connectivity requirements for the connection of all communications outlets, patch panels, and cabling appurtenances provided as part of this project.

   b. Other cabling systems meeting the listed performance and warranty requirements will be considered following compliance with all substitution requirements in accordance with Division 01 specification section titled “Substitutions.”

   2. CLASS TWO: Inner-duct systems. All material covered in “Class Two” shall be equal in quality and performance to that manufactured by Pyramid, Carlon or Endot or approved equal.

   3. CLASS THREE: Equipment racks, Wire Management Systems and Cable Trays. All material covered in “Class Three” shall be equal in quality and performance to that manufactured by APC. No substitutions accepted.

   4. CLASS FOUR: Velcro wire ties/cable wraps, storage rings, labels, "D" rings (metal only), nuts, bolts, screws, and other miscellaneous and appurtenant
hardware or approved equal.

5. CLASS Five: Cable Trays, Bonding Jumpers and related appurtenances. All material covered in “Class Five” shall be equal in quality and performance to that manufactured B-Line, CPI or approved equal.

6. CLASS Six: (Class Exempt) Active Electronics, Server, UPS units, Layer II and Layer III Data Switches and miscellaneous related Equipment/Hardware

B. All equipment and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer’s name on each component.

2.02 EQUIPMENT AND COMPONENTS

A. Data Communications Outlets (Wall Mount).
   a. Outlets consisting of box, wallplate, and connectors.
   b. Wallplates shall be stainless steel.
   c. Acceptable Manufacturers:

      1) The Siemon Company.
      2) Leviton Voice and Data Division.
      3) Hubbell Premise Wiring.
      4) Or Approved Equal.

   d. Faceplates shall be 4port Almond color TE Amp part number 557502-1 with color icons labeling the designated jacks as follows: voice - white cable white icon TE Amp part number 558821-8, data – gray cable black icon TE Amp part number 558821-6, data – blue cable blue icon TE Amp part number 558198-4, pink cable red icon TE Amp part number 558198-2 or approved equal.
   e. Surface Mount Box shall be Single Gang almond TE Amp part number 558251-1 or approved equal.

B. Patch Panels/Appurtenances (Communications Rooms)

1. Acceptable Manufacturers:

   1) AFL.
   2) Corning Cable Systems.
   3) Leviton Voice and Data Division.
   4) Hubbell Premise Wiring.
   5) Or Approved Equal.

2. Provide Fiber Optic Patch Panels (FOPP’s) in sufficient quantities to support all fiber terminations as indicated on the contract drawings: FOPP’s, installed at communications room locations.

3. Panel shall be constructed of 0.09 inch (2.2 mm) minimum aluminum and shall be compatible with an EIA 19 inches (480 mm) equipment rack.

4. Provide Category 6 Modular 24-port Patch Panels wired T568B wired

5. Patch Cables, Category 6, high performance:

   a. Lengths shall be three (03), five (05), seven (07), or ten (10) feet; and cord color shall be green for all communications system connections.
   b. Provide Two (2) patch cables for each populated patch panel port; one
seven foot long in the closet. All patch cables shall be 568-B approved and meet all product matching criteria. Supply minimum 7-foot and ten-foot lengths and cord colors as indicated for premise network connectivity.

c. All Category 6 Patch Cord must be provided by the same manufacturer as part of a certified structured cabling system and shall be color coordinated in accordance with cable and jack color coding requirements

1) Data – As directed by SEPTA
2) Telephone – As directed by SEPTA

6. Required Accessories and Quantities:

a. Provide rack mount enclosure panel – 24 2-port simplex SC Coupler Bezels, colors as selected by the Owner’s Representative - Eight (8) packages of 6-port ST coupler bezels are required for each FOPP installed.

b. Each panel shall be equipped fully loaded ultra polished ST style single-mode adapters with a pre-installed connectorized pigtail of sufficient length to be fusion spliced in a wall mounted splice enclosure as indicated on the Drawings. The adapters shall be constructed with a zirconia ceramic alignment insert and a metal housing. The adapters shall provide a maximum attenuation of 0.3 dB @ 1300 nm with less than a 0.2 dB change after 500 mating cycles. Adapters shall comply with EIA-455-21A. Provide dust cover for all unused adapters. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter.

c. Fiber patch cords: Provide at demarcation and each termination room locations 9.8 ft. (3.0 m) - 50/1258.3:125 SC- LC Fiber patch cords. Provide One Fiber Jumper for every two strands of single mode fiber originating in the demarcation room and all termination room locations.

d. Fiber Optic Splice Housing:

1) Splice housing shall be constructed of 0.09 inch (2.2 mm) minimum aluminum and shall be wall mountable

2) Splice housing shall provide storage and protection of fiber splices in individually accessible trays. Splice housing shall be equipped with cable strain-relief hardware, routing guides, record label on inside of front door, multiple grommeted cable entry ports. Each splice housing shall be equipped with the quantity of splice trays required to splice the quantity of fibers indicated on the Drawings. Splices shall be fusion type. The wall mounted splice housing shall be Corning part number WSH-16SPT with splice trays Corning part number M67-048-C or approved equal.

e. Provide all wire management: Front cord manager; Rear Cord Manager velcro tie cable managers; B-LINE, CPI PART #02006- 201 or approved equal. Provide 4”or 6” cable bundles as required;

1) Provide one Rear Cable Management Panel for each patch panel; One front Cable manager panel between each set of patch
panels; number of velcro hook an loop tie-wraps as required for neat and tidy rear cable management.

2) Provide Vertical Cable Manager 6"Wx14.94"Dx7'H for all 19-inch Equipment Racks as required; B-LINE, CPI PART #40098-703 or approved equal.

f. Fiber Optic Wall-Mountable Connector Housings

1) Wall-mountable connector housings provide interconnect or cross-connect capabilities between the outside plant, riser, or distribution cables and the opto-electronics.
2) Optimized design for field connectorization.
3) Suitable for loose tube and tight-buffered fiber optic cables.
4) Metal cabinet construction.
5) Jumper routing guides and jumper strain-relief point.
6) Bracket for buffer tube fan-out kits.
7) Pivoting splice tray holder.
8) Equipped with the quantity of approved splice trays required to splice the quantity of fibers indicated on the Drawings. Splices shall be fusion type.
9) Equipped with quantity of ST style single-mode adapters as indicated on the Drawings. The adapters shall be constructed with a zirconia ceramic alignment insert and a metal housing. The adapters shall provide a maximum attenuation of 0.3 dB @ 1300 nm with less than a 0.2 dB change after 500 mating cycles. Adapters shall comply with EIA-455-21A. Blank mounting plates shall be provided to fill up any unused locations. Provide dust cover for all unused adapters.
10) Durable clear polycarbonate-tinted jumper door for easy viewing of jumper connections.

C. Uninterruptible power supply

1. DC Power plant shall be NRS 19-48/24/12-RR-PSS-1.
   a. 48 VDC 6000 Watt Rectifier with 48VDC to 24 VDC and 48VDC to 12 VDC converters.
   b. 8 Hour Battery Backup
   c. Ethernet monitoring with SNMP Traps

2. AC UPS
   a. AC UPS shall be APC SMC-1000-2UC 1000VA Rack Mount 2U

D. Category 6 Cable

1. Acceptable Cable Manufacturers pending full compliance with the performance requirements herein specified:
   a. Belden.
   b. CommScope.
   c. General Cable.
   d. Mohawk/CDT.
e. Or Approved Equal.

2. Horizontal premise cable drops (Data):
   a. Comply with NFPA 70, NEMA WC 63.1, ANSI/ICEA S-80-576 and performance characteristics in ANSI/TIA/EIA-568-B.
   b. UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 24 AWG conductors, NFPA 70 CMP rated. Individual pairs shall be constructed to contain a minimum two twists per foot per each pair. Overall diameter of four pair cable shall not exceed 0.25 inches (6.32 mm). Ultimate breaking strength shall be minimum 90 pounds (40.82 kg). Four pair cable shall withstand a bend radius of one inch (25.4 mm) minimum at a temperature of minus 20 degrees C maximum without jacket or insulation cracking. Conductors shall be color coded and polarized in accordance with ANSI/TIA/EIA-568-B. Jacket sequentially marked at two-foot intervals. Shall conform to Category 6 requirements and be 1000BASE-T compliant.
   c. Category 6 cable color coding requirements shall be as directed by SEPTA.

3. Category 6 Horizontal Cable (Voice):
   a. Comply with NFPA 70, NEMA WC 63.1, ANSI/ICEA S-80-576 and performance characteristics in ANSI/TIA/EIA-568-B.
   b. UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 24 AWG conductors, NFPA 70 CMP rated. Individual pairs shall be constructed to contain a minimum two twists per foot per each pair. Overall diameter of four pair cable shall not exceed 0.25 inches (6.32 mm). Ultimate breaking strength shall be minimum 90 pounds (40.82 kg). Four pair cable shall withstand a bend radius of one inch (25.4 mm) minimum at a temperature of minus 20 degrees C maximum without jacket or insulation cracking. Conductors shall be color coded and polarized in accordance with ANSI/TIA/EIA-568-B. Jacket sequentially marked at two-foot intervals. Shall conform to Category 6 requirements.
   c. Category 6 cable color coding requirements shall be as directed by SEPTA.

4. NOTE: Category-6 cables shall not be cinched too tightly; cable ties at patch panel locations and termination locations shall be VELCRO type tie-wraps only. Plastic wire ties shall not be accepted on any Category-6 cabling.

5. Connectors:
   a. Voice:
      1) Connectors shall comply with FCC Part 68.5, and ANSI/EIA/TIA-568-B. UTP outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall comply with Category 3 requirements. Connectors shall be RJ25C terminated using a 110-style PC board connector. UTP connectors shall comply with EIA-455-21A for 500 mating cycles. Connector shall be color coded for telephone (color as directed by SEPTA). TE AMP part number 1375192-1 or equal
   b. Data:
      1) Connectors shall comply with FCC Part 68.5, and ANSI/EIA/TIA-568-B. UTP outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall comply with Category 6 requirements and be 1000BASE-T compliant.
Connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. Each jack shall be wired T568A. UTP connectors shall comply with EIA-455-21A for 500 mating cycles. Connector shall be color coded for data (color as directed by SEPTA). TE AMP part number 1375055-5 or equal

c. Acceptable Manufacturers: TE Connectivity or approved equal

E. 25-pair cable assemblies
   1. Acceptable Manufacturers:
      a. The Siemon Company.
      b. Or Approved Equal.
   2. Factory assembled Category 3 CMP 25-pair cable assemblies factory-tested for opens, shorts, and continuity.
   4. Cable length and connector ends (single-ended male or female, double-ended male or female, or one male/one female configuration) shall be as required for the application.

F. Fiber Optic Cable
   1. Acceptable Manufacturers:
      a. Corning Cable Systems.
      b. CommScope.
      c. AFL
      d. Or Approved Equal.
   2. Product: Provide fiber optic cabling in accordance with the requirements of all related specification sections, at the minimum 24 strands, SM cable unless otherwise indicated by the contract drawings. Premises Distribution (inside), tight buffered laser enhanced, with UV resistant outer jacket, all dielectric, 24 multi-mode OM4 or 24 single-mode 8.3/125µm “OS2” fiber strands as indicated by the contract drawings.
      a. Multi-mode maximum optical transmission loss shall be: 3.0 dB/km at 850 nm and 1.0 dB/km at 1300 nm; effective modal bandwidth (EMB) of 4700 MHz*km at 850 nm @ 10 Gb/s and a OFL bandwidth of 3500 MHz*km at 850 nm and 500 MHz*km bandwidth at 1300 nm. Multi-mode fiber shall conform to: TIA/EIA 568-B; EIA/TIA - 492 AAAC-B; and ANSI/ICEA S-83-596. (Use plenum rated armored cable only).
      b. Single-mode maximum optical transmission loss 1.0 dB/km at both 1310 and 1550 nm. Single mode fiber shall conform to TIA/EIA - 568 B, EIA/TIA - 492BAAA; and ANSI/ICEA S - 83 - 596 (Use plenum rated cable only and inner-duct).
      c. All exterior fiber optic cable shall be rated for exterior applications and listed as Outside Plant (OSP) type fiber and installed in dedicated inner-duct conduit system segregated by network type and routed through
d. UV-resistant, flame-retardant jacket

3. Required Accessories and Quantities:

a. Kit of Parts: Sufficient quantities to block and buffer both ends of each cable segment.
b. Sealant: Sealant sufficient quantities to block each end of each cable segment (outside plant cable only).
c. Provide Fan-Out kit for termination of the indoor fiber to the SC connectors.
   1) Two (2) simplex SC adaptors for each end of each fiber pair and shall meet all 568B requirements for connectivity. Color beige (or light gray) for multi-mode and blue for single-mode.

4. Fiber Optic Cable Terminations

a. Products: “2-Quick” SC connectors, Systimax STII connectors, or approved equal (for Multi-Mode).
b. Products: “2-Quick” SC connectors, Systimax STII connectors, or approved equal (for single-mode).
c. Products: “2-Click” LC connectors, Systimax STII connectors, or approved equal (for Multi-Mode).
d. Products: “2-Quick” LC connectors, Systimax STII connectors, or approved equal (for single-mode).

5. Fiber optic pigtails

a. Acceptable Manufacturers:
   1) Corning Cable Systems.
   2) The Siemon Company.
   3) AFL
   4) Or Approved Equal.

b. Factory-assembled pigtail with single-mode fiber and ST connector. Constructed with single-fiber cable, UL Listed OFNR, and suitable for splicing and routing cable on the front or rear of the hardware. Pigtails shall be 100% optically tested, and shall be compliant to TIA/EIA 604-2 and FOCIS 2.

G. Emergency Call Boxes

1. The Contractor shall coordinate the work for the Emergency Call Boxes (ECB) with the SEPTA.

a. The electrical contractor shall provide (furnish and install) the following items:
   1) Junction boxes with blank covers will be mounted at each ECB
location, and one in the main office.

2) Conduit from each of the ECB location junction boxes to the main Communications Room.

3) Each ECB shall have its own individual home run. Installed in the conduit shall be one pair of plastic insulated No. 18 AWG and one Category 6 cable (final cables sizes as per the Manufacturer’s recommendation based on voltage drop).

4) Power Cable TWPR, 18 AWG, plenum insulation, aluminum polyester shield, chrome sunlight resistant jacket, temperature rating: 105 degrees Celsius, and voltage rating: 300 volts.

5) Cables shall be terminated as per the contract drawing.

6) Signal and data cables shall be Category 6 Shielded or and conform to EIA/TIA 568A. cable.

2. Emergency Call Box System cables to be installed to each device, accessory, phone, etc. The final cable sizes shall be determined by the Manufacturer based on the allowable voltage drop. Cables shall be as follows:

a. One cable consisting of one pair of plastic insulated No. 18 AWG stranded copper wires with overall plastic jacket.

b. One Category 6 horizontal cable, which, except for wire gauge, shall be in accordance with Section 16715.

3. The following Emergency Call Boxes (ECB) shall be provided at the following descriptive locations:

a. ECB’s for all wall Mount locations except the elevators and office shall be: T2100 ADA compliant full duplex emergency telephone with A708 blue light and strobe and AE741 housing.

b. ECB’s for flush mount locations: T2100 with AE739 housing.

4. Provide wiring and rigid galvanized steel conduit to each of the above device types, where indicated on the Drawings.

5. Furnish and install all necessary wiring, components and accessories for a complete and fully operational Emergency Call Box System (ECB).

H. Cashier Booth Connectivity

1. Programmable Logic Controller: Provide a Phoenix Contact Cashier Booth Automation Panel, Phoenix Part Number: 2701677. Panel shall be compromised of but not limited to the following:

a. NEMA 4X stainless steel cabinet
   1) Dimensions: 20"H x 16"W x 8"D
   2) Enclosure Backplate

b. ILC 170 ETH 2TX, modular Inline controller with integrated Ethernet interfaces

c. MINI-PS- 48- 60DC/24DC/1 - DC to DC converter

d. IB IL 24 DO 4-ME - Inline digital output terminal, Inline ME versions (machine edition) complete with accessories (connector and labeling field), four outputs, 24 V DC, 500 mA, 2, 3-conductor connection method

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e. IB IL 24 DO 16-ME - Inline digital output terminal, Inline ME versions (machine edition) complete with accessories (connector and labeling field), 16 outputs, 24 V DC, 500 mA, 2, 3-conductor connection method
f. IB IL 24 DI 16-ME - Inline digital input terminal, Inline ME versions (machine edition) complete with accessories (connector and labeling field), 16 inputs, 24 V DC, 2, 3-conductor connection method
g. FL SWITCH SFN 4TX/FX ST - Ethernet switch, 4 TP RJ45 ports, 1 FO port, 100 Mbps full duplex in ST-D format, automatic detection of data transmission speed of 10 or 100 Mbps (RJ45), autocrossing function
h. UKK 5-HESI (6,3X32) - Fuse terminal block,
   1) Connection method: Screw connection,
   2) Cross section: 0.2 mm² - 4 mm², AWG: 24 - 12,
   3) Nominal current: 32 A,
   4) Nominal voltage: 400 V,
   5) Width: 8.2 mm,
   6) Fuse type: G / 6.3 x 32,
   7) Fuse type: Glass,
   8) Mounting type: NS 35/7.5, NS 35/15, NS 32,
   9) Color: black
i. PLC-RSC- 24DC/21 - PLC relay, consisting of base terminal block PLC-BSC.../21 with screw connection and pluggable miniature relay with power contact, for assembly on DIN rail NS 35/7.5, 1 PDT, input voltage 24 V DC.

2. Provide Integrated Circuit Controller with the required buttons.
3. Provide CAT6 or Fiber connection as necessary back to the Communications Room with final connection to SEPTA's fiber network, OTN.

PART 3 – EXECUTION

3.01 EQUIPMENT PROTECTION

A. Comply with all requirements of specification section 16700.
   1. Examine all physical and environmental conditions, equipment and device locations, auxiliary system connectivity requirements impacting the installation of all network systems and report any unsatisfactory conditions in writing to the Owner's Representative.

3.02 WORK PERFORMANCE

A. In addition to all requirements as specified by Specification Section 16700 the network communications systems shall also be provided in accordance with the following requirements:

   1. Prior to the final commissioning and/or programming of any network communications components, the Contractor shall provide a review with the Owner's Representative addressing all network integrations, programming and related operational connectivity.

      a. Failure to provide this review and get final sign-off prior to programming
shall result in any costs related to changes requested by the Owner’s Representative as not being charged to the project.

3.03 EQUIPMENT/CABLE INSTALLATION AND REQUIREMENTS

A. In addition to all requirements as specified by Specification Section 16700 the network communications systems shall also be provided in accordance with the following requirements:

1. All system cabling shall be of the type, size, and specification as required by all contract documents as well as stipulated by all codes and standards as specified by specification section 16700.

2. All network communications cabling shall utilize Category-6 UTP cables and installed in accordance with the requirements of specification section 16700. All network cabling bundles shall not contain any AC carrying conductors or non-associated network communications cables within the cable raceways/conduits or cable bundles.

a. In addition, all structured cabling associated with the installation of any network communications system shall comply with all requirements of EIA/TIA standards for the proper installation, termination and testing of all fiber optic and Category-6 UTP cabling.

b. Contractor shall provide all equipment, components, devices, hardware, equipment racks/cabinets, patch panels, and all appurtenances necessary to provide fully operational network communications systems utilizing a UTP cabling topography. Coordinate all structured cabling with all trades and contractors prior to shop drawing submission.

3.04 TRANSIENT VOLTAGE SUPPRESSION

A. Comply with all requirements of specification section 16700.

3.05 GROUNDING AND BONDING

A. Comply with all requirements of specification section 16700.

3.06 EQUIPMENT IDENTIFICATION

A. Comply with all requirements of specification section 16700.

3.07 CLEANING

A. After installations, contractor shall vacuum interior and wipe clean of all foreign material.

B. Unpack all material and dispose of all trash and related material offsite. Keep work area clean.

3.08 MAINTENANCE & SERVICE

A. Comply with all requirements of specification section 16700.
3.09 WARRANTY

A. Comply with all requirements of Specification Section 16700.

B. Provide all manufacturers extended cable warranties based on matching wire to component compatibility requirements. All cable warranties shall be in effect for a period of not less than 20 years.

C. The warranty must include the following statements regarding the cabling system:

1. "That all communications networks have been certified and will support and conform to ANSI/TIA-568-C specifications covering any current or future application which supports transmission over a properly constructed and horizontal cabling system premises network which meets the channel and/or basic link performance as described in ANSI/TIA-568-C."

2. "That all communications networks are free from defects in material or faulty workmanship."

3.10 FIELD SERVICES

A. Comply with all requirements of Specification Section 16700.

3.11 TRAINING

A. Comply with all requirements of specification section 16700.

B. Documentation:

1. Contractor shall provide documentation to include all test results and as-built drawings, test results shall be computer generated and shall include all trace reports indicating each pair tested in accordance with all requirements of specification section 16700.

   a. One Hard Copy shall also be provided to the Owner's Representative. Software for viewing the test results shall also be provided in the soft copy package.

C. Final Acceptance

1. Acceptance of all network communications systems, by the Owner's Representative, shall be based on the results of testing, functionality, and the receipt of documentation. The testing, of all UTP cabling, fiber segments and all premise data cables must meet the criteria established in the specification sections 16700.

2. The Contractor must demonstrate to the Owner's Representative that 1000 Mbps data signals can be successfully transmitted, bi-directionally, from the layer II switch to and from a minimum of 10% of individual data drops on each floor, witness tested by the Owner's Representative. The number of data drop locations to be tested shall be determined by Owner's Representative. With
regard to documentation, all required documentation shall be submitted to Owner's Representative.

D. As-Built Documentation:

1. Contractor shall provide clean copies of the technology drawings depicting all as-built conditions for all data drop locations, cable routing and identification, patch panel, data switch port terminations, component layouts and all information as required by division 01 specification section.

END OF SECTION 16710