DATE: June 20, 2023

DEPARTMENT OF GENERAL SERVICES
BUREAU OF CAPITAL PROJECT DESIGN MANAGEMENT
1800 HERR STREETS
HARRISBURG, PENNSYLVANIA

ADDENDUM NO. 27

on

PROJECT NO. DGS C-0211-0005 PHASE 005
PROJECT TITLE - PA State Police Academy - Core Bldgs, BESO & Sitework
PROFESSIONAL:
SOM
7 World Trade Center
New York, NY, 10007

If you submitted a bid prior to this Addendum being issued, your bid has been discarded and you must re-submit your bid(s) prior to the bid opening date and time.

GENERAL CHANGES – ALL CONTRACTS

Item 1 - Please note the following:
Final questions must be submitted via e-Builder no later than 5:00 PM ET on Tuesday, July 18.
Final Addendum will be issued via e-Builder no later than Tuesday, July 25th.
Bids are due by Tuesday, August 1, no later than 2:00 PM. This is a very tight bidding schedule so please manage your time effectively.

Item 2 - Addendums for this bid begin with Addendum 24. Please note that Addendums 1-23 were issued in the course of the previous bid process and can be disregarded for the purposes of this bid. Items issued in addendums from the previous bid process have been incorporated into the current, re-issued bid documents.

Item 3 - Additional individuals from any bidder wishing to gain access to the bid documents must register through eMarketplace and create an account to access e-Builder. Access cannot be granted in any other fashion.

Item 4 - If you are having any issues accessing any of the addendums, please try using Google Chrome as your browser.

Item 5 - Unit Price Items apply to all points of construction, General, HVAC, Plumbing and Electrical. Refer to the Unit Price Schedules included in the Bid Documents.

Item 6 - In response to questions submitted, please note the following:
.1 CONTRACT

- Question 5: Drawing STE-C-301 calls for "memorials to be removed - coordinate with owner and architect". We need to know what is to be coordinated so that we can price accordingly.
- Response: Refer to revised STE-C-301 as issued in Addendum 27, with note revised. Memorials are to be removed, no additional coordination required.
- Question 12: Most of the PFI items in this specification don't provide enough information or selection to know what to price and install. Please provide this information.
- Response: Per specification 066400- See drawings for details and dimensions. Refer to ITV-A-600 through 604 and ITV-A-783, for details on the PFI items. See the revised Specification Section 066400 as issued in Addendum 27 included for further clarification on the PFI items.

- Question 17: Per BSO-A-652, the exterior perimeter fence is labeled KEQ-08. On BSO-A-251, the exterior perimeter fence is labeled KEQ-07. Please confirm KEQ-08 is correct.
- Response: KEQ-08 is correct for perimeter fencing as shown on BSO-A-652. Refer to revised BSO-A-251 as issued in Addendum 27.
- Question 18: Drawing GYM-A-655 calls for a mini fridge REQ-5 in Exam Room G-104. The other exam rooms don't have a mini fridge. Please confirm.
- Response: Confirmed. Exam Room G-104 is the only exam room with mini fridge REQ-05.
- Question 19: Spec 113000 lists REQ-05 as Not Used but REQ-05 shows up on drawing GYM-A-655. Please advise.
- Response: REQ-05 is an under counter mini fridge. See revised spec section 113000 as issued in Addendum 27.
- Question 20: Spec 113000 - Has REQ-08 mentioned in the spec description, but does not have a product called out. Please advise what appliance should be included for REQ-08 - Location GYM-A-750.
- Response: REQ-08 is an under counter ice maker. See revised spec section 113000 as issued in Addendum 27.
- Question 21: Elevation 4/BSO-A-656 lists REQ-05, but points to a cabinet. Is an appliance supposed to go there? Please advise.
- Response: REQ-05 is an under counter mini fridge. See revised spec section 113000 as issued in Addendum 27.
- Question 22: REQ-06 is not listed on drawing GEN-G-105. On drawing 3/BSO-A-663 it points to a coffee maker. In spec 113000, it is listed as a dishwasher. Please advise.
- Response: Coffee makers to be FF&E. See revised BSO-A-663 as issued in Addendum 27.
- Question 23: Please provide selection for REQ-03.
- Response: See revised spec section 113000 as issued in Addendum 27.
- Question 24: REQ-07 in spec 113000 is called out as Under Counter Ice Maker and is labeled on BSO-A-664 as a dishwasher. Please advise.
- Response: REQ-07 is a dishwaser. See revised spec section 113000 as issued in Addendum 27.
- Question 25: Please confirm the pandemic safety officer doesn't apply to this project.
- Response: Confirmed, pandemic safety officer does not apply.
- Question 26: Spec 015000 1.4D notes that the HVAC contractor is responsible for the temp heat and personnel after the building is enclosed. 1.4G then notes that Lead Contractor is responsible for paying for fuel and electricity. Please confirm the HVAC contractor should pay for the fuel and electricity because they will be selecting and placing the equipment and will know the requirements.
- Response: Per specification section 015000, prior to enclosure of building, each contractor shall provide, maintain, operate, and pay all costs, including fuel for a sufficient number of approved portable heaters, so that the progress of its work is not impeded. (1.4 C) After building enclosure. the .2 HVAC Contractor is responsible for providing temporary heat (1.4 D), with fuel and electricity paid for by the .1 General Contractor (1.4 G). Fuel and electricity requirements for temporary heat following building enclosure will require coordination between the .1 General Contractor and the .2 HVAC Contractor during construction.
- Question 27: Addendum #25 spec 013110 notes that the water tower is to stay operational until the pump house and other water infrastructure is operational. Inferring that the tower is to removed after that point. The civil plans show the tower to remain permanently. Please advise.
- Response: There are two water towers on campus. The PSPA Water Tower, shown to be demolished on STE-C-301, is referenced in spec section 013110 and is to remain and stay operational until the pump house and other water infrastructure is operational. The American Water Co. tank, part of the adjoinining property, shown on drawing STE-C-303, is to be protected throughout the duration of construction and remain.
- Question 28: Addendum 25 spec 013110 notes that the existing stables can't be removed until new stables and garage are completed. The new stables and garage are not in this contract so we don't know when they will be completed. Please provide this information to form our schedule.
- Response: Refer to revised 013110 spec section as issued in Addendum 27. Package 1 .1 General Contractor to coordinate with Package 2 .1 General Contractor during construction.

- Question 29: Addendum #25 section 013110 notes that the existing Building and Grounds building needs to stay operational until the new Automotive, Building, and Grounds building is complete. These new buildings are not in this contract. Please provide the timing for the new buildings to be complete so we can incorporate in our schedule.
- Response: Refer to revised 013110 spec section as issued in Addendum 27. Package 1 .1 General Contractor to coordinate with Package 2 .1 General Contractor during construction.
- Question 30: Addendum #35 013110 doesn't mention the existing garage building across from the Stables. When can that be demolished?
- Response: Refer to revised 013110 spec section as issued in Addendum 27. Existing stables garage building (immediately east of existing stables) can be demolished once construction of Stables and Stables Garage (not in contract) are complete and the buildings achieve beneficial occupancy. Existing Garage Building A (2-Story Brick Building) can be demolished once construction of Automotive Building and Grounds building (not in contract) is complete and the building achieves beneficial occupancy.
- Question 31: Addendum #25 013110 doesn't mention the Garage Building B and the three small buildings to the west of B. When can those be demolished?
- Response: Refer to revised 013110 spec section as issued in Addendum 27. Existing Garage Building B and associated buildings can be demolished once construction of Automotive Building and Grounds building (not in contract) is complete and the building achieves beneficial occupancy.
- Question 32: Addendum #25 013110 doesn't address how much marking needs to remain during construction. Please advise.
- Response: Please confirm our interpretation of the word "marking" in this question as referring to "parking". Refer to revised 013110 spec section as issued in Addendum 27. A minimum of 50 contractor parking spaces are to be maintained during construction.
- Question 33: Please provide the civil CADD files.
- Response: CAD files will not be provided to prospective bidders prior to contract award.
- Question 34: Addendum #25 RFI#17 response noted that multiple firms are not to be retained for the same scope across the "project". Due to the size of the project, it might be necessary to hire different specialty contractors for different buildings in order to staff the project. Please confirm this requirement is meant to be per building and not across the whole project.
- Response: Requirement is to be applied per building. Refer to revised spec section 080350 as issued in Addendum 27 for clarified language.
- Question 35: Please provide details for trash enclosures. The landscape drawings refer to 6' enclosures but we are not able to find any details.
- Response: Refer to revised landscape drawings STE-L-102, STE-L-103 and STE-L-110 as issued in Addendum 27 clarifying trash enclosure scope.
- Question 36: The drawings call the pasture area as "Future Pasture". Is the pasture fence to be installed in this package?
- Response: Future pasture fencing is to be excluded from Package 1 scope.
- Question 37: Please confirm the riding ring is to be installed in this package.
- Response: Riding ring fencing is to be excluded from Package 1 scope. Area to be used for stockpiling material as needed.
- Question 38: Safety Rail detail on STE-C-454 notes that the rail is to be installed 15' before and after "area of need". Since these are being installed at the retaining walls, please confirm they only need to be as long as the retaining walls.
- Response: Confirmed, site safety rails only need to be installed on the length of the retaining walls.
- Question 39: Please provide more TW and BW elevations for both BESO retaining walls. There aren't enough to calculate the SF of wall. Also, please confirm both get safety rails the entire length.
- Response: Refer to revised STE-C-504 as issued in Addendum 27 for clarification.
- Question 40: Please clearly define what buildings and structures need to be monitored per spec 310901. Do the existing buildings that are no longer being removed as part of this contract need to be monitored? It doesn't look like any neighboring buildings on other properties qualify. Do the buildings at the existing outdoor fire range need to be monitored? Museum? Water tower?
- Response: Scope applies only to existing monitoring to be on the existing building to remain within 100 feet of the soil nail wall. Refer to specification section 310901 as revised in Addendum 27.

- Question 41: Please provide details for 5' high mesh pasture fence.
- Response: Contractor to match existing pasture fence as noted on STE-C-402.
- Question 42: Does the fuel tank pad require an enclosure? If so, please provide details.
- Response: No enclosure is required.
- Question 43: Trees 86 and 3 are called to be protected in the table, but are shown to be removed on the plans. Please advise.
- Response: Refer to revised landscape drawing STE-L-010 as issued in Addendum 27 clarifying tree removal scope.
- Question 44: The tree protection drawings and the site demolition plans are conflicting in regard to which trees are protected. Please advise. Also, trees 34,35,37,44,45, and 46 from the tree protection plan don't seem to show up on the demo plans or site layout plan.
- Response: Refer to revised landscape drawings STE-L-010 and STE-L-014 as issued in Addendum 27 clarifying tree removal scope.
- Question 45: Please confirm where the chainlink fencing per detail on STE-C-452 applies in the plans.
- Response: Chainlink fence footing detail applies to trash enclosure fencing. Refer to revised landscape drawings STE-L-102, STE-L-103 and STE-L-110 as issued in Addendum 27 clarifying trash enclosure scope.
- Question 46: Spec 313236 1.3E talks about evaluating existing buildings to remain to see if they need reinforced or underpinned after the design of the soil nails. Since this won't be evaluated until after project award, please provide an allowance for all contractors to carry for this work or exclude this from the base bid.
- Response: Contractors should provide lump sum bid cost for underpinning/structural support of existing building. Refer to information provided in response to Question 4 regarding extent of soil nail wall regarding coordination of soil nail wall and existing building to remain.
- Question 47: The scope of work for this spec is not quantifiable during the bidding stage. We don't know what buildings to monitor and the amount of gauges, seismographs, and frequency of monitoring won't be determined until after a "Pre-construction Conditions Documentation" has been completed. Please provide an allowance for all bidders to include for the cost proposal.
- Response: Scope applies only to existing monitoring to be on the existing building to remain within 100 feet of the soil nail wall. Refer to specification section 310901 as revised in Addendum 27.
- Question 48: Please confirm that all references to "Special Inspections" in the trade specifications falls under the Quality Assurance Testing and Inspection Services in spec 014040.
- Response: This response will be included in an upcoming addendum.
- Question 49: Spec 015000 1.11 calls for General Contractor to provide "hoisting facilities" for "all work". Please confirm what "hoisting facilities" means and what does "all work" mean. The GC isn't going to provide material lifts or cranes for other primes.
- Response: This response will be included in an upcoming addendum.
- Question 50: In some cases, the grading at the trees that are shown to be protected and remain will be 1-2' higher than the current grade. Please confirm the existing trees to remain can handle an additional 2' of grading.
- Response: Refer to STE-L-304/C for landscape grading around trees to be preserved. It is anticipated that grading at existing trees will be coordinated with contractor, engineer, arborist, and landscape architect during construction to confirm grading over tree root systems.
- Question 51: BSO-S-201 calls for an MSE wall and refers us to "MSE Wall Specification" for requirements. Please provide this spec.
- Response: Refer to revised BSO-S-201 as revised in Addendum 27, note for MSE Wall Specification is removed. MSE wall is delegated design by the contractor, refer to note on BSO-S-201 for design requirements.
- Question 52: BSO-S-201 - How far back from column line B10 does the MSE have to go?
- Response: The MSE is delegated design; therefore, the contractor must determine the length of reinforcing. The design of the MSE wall should be included in the bid.
- Question 53: The table of contents lists spec section 034500 Precast Architectural Concrete. What is actually provided is spec 034100 Structural Precast Concrete. Please advise on spec 034500. Also, please confirm where 034100 Structural Precast applies.

- Response: Disregard spec section 034100 Precast Structural Concrete, it does not apply to scope in this project. Spec section 034500 Precast Architectural Concrete is issued in Addendum 27.
- Question 54: Drawing STE-L-010 notes that the project arborist shall be Keith Pitchford. Keith has declined to be the arborist due to being too far away for this project. Please advise.
- Response: Alternative arborists can be used provided they are ISA certified arborists as indicated in Specification Section 015639.
- Question 55: The Spray-on Fireproofing Notes of the Clarifications of Work section on page GEN-G-100 indicate the Marquee Building as Type IA and Type IIIA construction, however, the MAQ-LS-001 drawing indicates Type IA and Type IIIB. Which is correct?
- Response: Type IIIA is correct. Refer to revised MAQ-LS-001 as issued in Addendum 27.
- Question 56: Table of contents lists spec section 119010 for range equipment. This spec section is not in the spec book. Please advise.
- Response: This response will be included in an upcoming addendum.
- Question 57: Please provide clear direction on the scope for bird control devices. Drawings MAQ-A-160/161 point to M37 which references bird control devices and notes that it is to be installed where two parallel exterior walls are less than 1' apart. However, the spot that is pointed to is more than 1' apart. It is not clear where and how much quantity of bird control devices are required.
- Response: This response will be included in an upcoming addendum.
- Question 58: Please confirm the quanitities that are listed in the unit price sheet are to be included in the base bid and that they are to be over and above any quantities specifically shown on the drawings.
- Response: Confirmed, quantities listed in unit price sheet are to be included in base bid, and are over and above quantities specifically shown on drawings.
- Question 59: Please confirm that the .2, .3, and .4 prime contractors are responsible for disconnecting existing utilities and making safe for all buildings to be demolished.
- Response: This response will be included in an upcoming addendum.
- Question 60: Please provide tree sizes for American Holly and Tickseed on drawing STE-L-510.
- Response: This response will be included in an upcoming addendum.
- Question 61: There is a 44' high masonry wall where the Marquee building meets the FTUE. Should there be a horizontal joint in that wall? If so, please show where this should be.
- Response: This response will be included in an upcoming addendum.
- Question 62: Is there to be a backer road underneath WPS-01 at the back side of the brick shelf on detail 1/GEN-A-520?
- Response: This response will be included in an upcoming addendum.
- Question 63: Please confirm which of the existing buildings is the "Building and Grounds" building.
- Response: Existing Building and Grounds building is referred to as "Garage Building A 2-Story Brick Building" on drawing STE-C-304.

SPECIFICATION CHANGES – ALL CONTRACTS

Item 1 - Please refer to the attached documents for updated specifications as described in responses to questions and listed below.

NUMBER / NAME / ACTION

013110 / Sequence of Construction and Milestones / Revised
034500 / Precast Architectural Concrete / Issued
066400 / Plastic Fabrications / Revised
080350 / Exterior Enclosure - General / Revised
113000 / Residential Appliances / Revised
310901 / Monitoring of Structures and Utilities / Revised

DRAWING CHANGES – ALL CONTRACTS

Item 1 - Please refer to the attached documents for updated drawings as described in responses to questions and listed below.

NUMBER / NAME / ACTION

STE-C-301 / SITE DEMOLITION PLAN 1 / Revised (clarified demolition note)
STE-C-504 / GRADING PLAN 4 / Revised (clarified wall elevations)
STE-L-010 / TREE PRESERVATION TABLE / Revised (clarified tree removals)
STE-L-014 / TREE PRESERVATION PLAN-TILE D / Revised (clarified tree removals)
STE-L-102 / MATERIALS PLAN - TILE B / Revised (clarified trash enclosure scope)
STE-L-103 / MATERIALS PLAN - TILE C / Revised (clarified trash enclosure scope)
STE-L-110 / MATERIALS SCHEDULE / Revised (clarified trash enclosure scope)
MAQ-LS-001 / GENERAL LIFE SAFETY TABLES / Revised (corrected construction type notes)
BSO-A-251 / BUILDING SECTIONS / Revised (clarified fencing notes)
BSO-A-663 / INTERIOR PLANS RCP AND ELEVATIONS - CLASSROOM / Revised (clarified appliance notes)
BSO-S-201 / FOUNDATION SECTIONS / Revised (clarified MSE wall notes)
OTV-PH-S-101 / FRAMING PLANS - LEVEL 1 AND 2 / Issued

SECTION 013110

SEQUENCE OF CONSTRUCTION AND MILESTONES

PART 1 – GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions of the Construction Contract", "Special Conditions", and "Division 1 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 GENERAL REQUIREMENTS

A. Before beginning work, the Contractor will be required to prepare a Critical Path Method (CPM) Project Schedule in consultation with the Department and all of the other Prime Contractors. The work must be carried out in full accordance with the schedule. The Contractor shall arrange to perform the work without any unnecessary interference with the Institution's operation.

B. The Project Schedule shall be developed in conformance with Article 8 of the General Conditions of the Contract, except as modified and/or augmented by this Section.

C. The detailed Project Schedule shall be developed in accordance with the Contract Documents, with the General Contractor being the "Lead" Contractor. The Lead Contractor shall furnish each Prime Contractor a draft progress schedule of the proposed prosecution of the Work under that Contractor's Contract within seven (7) calendar days of the Effective Date of the Contract or the date directed in the Letter of Intent to Contract. All Prime Contractors must provide the required scheduling data for their work to the Lead Contractor within seven (7) calendar days of the receipt of the Lead Contractor's draft progress schedule to facilitate the development of the CPM schedule. The submission of the Project Schedule, and all subsequent updates, shall be done in eBuilder utilizing the scheduling software native file as well as in PDF format (including all requested sorts and arrangements, utilizing color print). The attachments in e-Builder shall include all unlocked data files in the **Primavera** scheduling system used to develop the schedule. The start date on the schedule shall be the Initial Job Conference and end with the Contract Completion Date. The final fully integrated and detailed Project Schedule, accepted by all Prime Contractors, must be submitted in eBuilder for Professional and Departmental acceptance within thirty (30) calendar days of the Effective Date of the Contract or the date directed in the Letter of Intent to Contract.

D. The use of float suppression techniques, such as preferential sequencing (arranging the critical path through activities more susceptible to Client Agency or Department caused delays), special lead/lag logic restraints, zero total or free float constraints, extended activity times or imposing constraint dates other than as required by the contract, shall be cause for the rejection of the submitted project schedule or it's updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly forbidden.

E. Contractors shall also track submissions, ordering dates and delivery of materials in the Project Schedule.

F. A large sized copy of the accepted Project Schedule shall be maintained and posted in the DGS Construction Coordinators field office for access and monitoring of the progress of the work activities. At the direction of the Department, large sized copies of monthly schedule updates shall also be provided, posted and maintained in the DGS Construction Coordinators field office

1.3 CRITICAL MATERIALS AND EQUIPMENT

A. The contractor shall provide all required shop drawings, descriptive data, etc. (submittals) for critical and long lead materials and equipment within fourteen (14) calendar days from the date of the Letter of Intent to Contract.

1. Critical/long lead items shall include but are not limited to:

a. Hazardous Materials Abatement Plan
b. DEP notification for Abatement
c. Unitized Curtain Wall
d. Aluminum and Glass Storefronts
e. Entry Vestibules
f. Aluminum and Glass windows
g. Hydronic system pumps
h. Air handling units
i. Aluminum and Glass Office fronts (demountable partitions)
j. Reception desk stone and millwork
k. Stone cladding at memorials
l. Auditorium wood panels
m. Mock Court Room Millwork
n. Carpet
o. Auditorium & Classroom fixed Seating
p. Floor Grilles
f. Any materials and/or equipment that have a lead time of longer than four (4) weeks.
g. Any materials and/or equipment required to be on site for use within the first five (5) weeks after the Initial Job Conference.

B. Each Contractor shall recognize and acknowledge that all critical materials and equipment shall be ordered immediately after receipt of approved shop drawings to ensure that lead time and shipping will not delay the progress of the work or completion of the project. Any costs necessary to expedite manufacturing and/or delivery of materials and equipment to maintain the project schedule shall be the responsibility of each Contractor, no additional costs will be paid by the Department.

1.4 MILESTONES

A. Refer to the General Conditions of the Construction Contract regarding construction progress Milestones to be established by all Prime Contractors. The accepted Project Schedule shall also incorporate the milestones outlined in this specification section as well as additional milestones for interior construction and other work to ensure the timely completion of the Project.

1. In addition, Contractors shall track submissions, ordering dates and delivery of materials in the Project Schedule.

B. The milestones noted in this section of the specifications apply to all the Prime Contractors. The General Construction (.1), HVAC (.2), Plumbing (.3), and Electrical (.4) Prime Contractors shall adhere to the milestones and incorporate their work activities into the Project Schedule in order to achieve the milestones for the program per the contract documents.

C. The Milestones noted in this section shall be incorporated into the Project Schedule. A Milestone shall be considered missed if the Finish Date of a Milestone activity is missed.

D. These prime contractor Milestones are not meant to be all inclusive for any contractor. It is each prime contractor's responsibility to understand the work required and to recognize and identify each critical Milestone and task required to complete the project on schedule. The Department reserves the right to add, delete and/or modify milestones at time of schedule review and acceptance or as necessary throughout the project.

E. The milestones noted in this section of the specifications apply to all the Prime Contractors. The HVAC and Electrical Prime Contractors shall adhere to the milestones and incorporate their work activities into the Project Schedule in order to achieve the milestones for the project per the contract documents. (Example: wall rough in work must take place with the wall construction milestones, etc.).

1.5 PROJECT

A. The overall project must be fully completed within the Contract Completion date. In order to achieve timely completion, this project will be constructed in one phase with multiple milestones. In addition to the milestones shown in this section, each Prime Contractor must develop its own milestones, which must be incorporated into the Project Schedule. This section of the specifications includes a brief narrative of the specific milestones that will be incorporated into the Project Schedule as contractual obligations, along with special requirements and constraints. Each Prime Contractor shall be responsible for reviewing these requirements to determine the effect on the other Prime Contractors as it relates to their scope of work, temporary protection, temporary utilities, material deliveries, manpower schedule, shift work, equipment required, etc.

1.6 CONSTRUCTION PROGRAM

A. The entire scope of work for the Project (as indicated on the Drawings and Specifications, including all Addenda and modifications thereto) shall be completed within the time period outlined in this section of the specifications and in accordance with the hereinafter-specified requirements. It shall be the responsibility of each Prime Contractor to inform all suppliers and subcontractors (of any tier) of the construction program procedures. Due to the compressed time period for construction of this project, work activities shall be performed concurrently; thereby creating accelerated work and inefficient conditions. Each Prime Contractor shall recognize and acknowledge these working conditions will exist as a contractual inherent feature of this Project. Each Prime Contractor shall account for these conditions in their bid. No additional compensation will be paid for failing to include all requirements as set forth in the construction program.

B. Time is of the essence for this Contract. Each Prime Contractor and all their subcontractors (of any tier) shall employ a sufficient number of qualified employees, supervision/management, equipment and project resources, required to meet the milestones and completion date established for this Project. Each Prime Contractor shall perform the Work on multiple shifts during each 24-hour day period, if needed, to meet all milestones and complete the interior work of the Project by the required completion date as set forth for this work. Proper supervision must be provided for all work activities. No work shall be covered or concealed during off-shift work activities in such a manner that it cannot be observed the morning of the next work shift by the Department of General Services. See section 1.6.E below regarding the Pennsylvania Department of Labor and Industries (L&I) inspections.

C. Each Prime Contractor shall coordinate with the Department any scheduling requirements in order to avoid disruption of programs and activities, as well as to coordinate the location of the various structures to be constructed (i.e. temporary trailers, temporary construction fences, temporary enclosures, temporary partitions, etc.) All work performed under this Project shall be performed in a manner that will not disrupt the Client Agency's activities in and around the facility.

D. All Prime Contractors are expected to work outside of normal work hours, in shifts and on weekends as necessary to maintain the Master Project Schedule. All Prime Contractors are to comply with noise levels restrictions in accordance with all local ordinances. This may require exterior work to be completed during the day shift only.

E. Each Prime Contractor shall coordinate and schedule inspections as required by the provisions of the Building Permit issued by Pennsylvania Department of Labor and Industry (L&I). The L&I Inspectors will only be available during the day shift. L&I Inspectors availability does not constitute a delay to the progress of the Project and shall be considered when scheduling and completing the work of this Project.

F. It is understood that during the duration of the Project, changes may be made to the Project Schedule without the Department incurring additional costs or granting extensions of time to the Contract.

G. Change Orders will occur on this Project to address unforeseen conditions, errors and/or omissions in the documents and other potential reasons. It shall be mandatory that each Prime Contractor (along with all its subcontractors of any tier) provides necessary additional and separate work forces to accommodate these changes in a manner to eliminate any delays to milestones or the overall project schedule. The Department shall issue no Extension of Time for performance of Change Order work; all time must be recovered in the affected work activities.

H. The Department reserves the right to delay or suspend any work, without compensation due any of the Contractors, if the Department determines that any work would disrupt activities in or around the facility.

I. It shall be understood that there shall be a number of independent work activities occurring within this building by other means of procurement and by other contractors and vendors outside this Project. The other work activities shall commence prior to the Final Inspection and/or Punch List period for this Project. As such, each Prime Contractor shall have an affirmative duty to accommodate this effort while working with and cooperating with all these other entities, individually or collectively, as well as with the Department and Client Agency. The Milestones denoted in this section are established to define the anticipated sequence and identify the areas (as well as time frames) that must be completed to facilitate this effort. Reference paragraph 1.10 for a more detailed summary of anticipated “work by others”. Each Prime Contractor shall provide the necessary additional supervision, project management and overall coordination necessary to avoid adversely affecting the work being performed by these other entities. Each Prime Contractor shall consider this condition and include any costs associated with this effort in their bids.

J. The Department will notify the Prime Contractor(s) that they are in default of the Contract in the event that:

1. Any Prime Contractor fails to achieve any milestones established for the building program in accordance with the Contract Documents and the Project Schedule, or
2. Any schedule update showing the work is behind schedule and the Project is in jeopardy of not meeting the milestone dates or the overall contract completion date.

K. Unless directed otherwise by the Department, immediately upon the issuance of the Letter of Intent to Contract, each Prime Contractor shall begin the submittal process and shall have all critical submittal items for the project submitted through e-Builder to the Professional within fourteen (14) calendar days after the issuance date of the Letter of Intent to Contract (in accordance with paragraph 1.3 of this Section). All Prime Contractors shall submit their Priority Submittal Schedule to the Professional within seven (7) calendar days of the issuance date of the Letter of Intent to Contract. The project non-critical submittals shall be submitted to the Professional within forty-five (45) calendar days of issuance of the Letter of Intent to Contract, or sooner if needed to maintain the construction schedule. Any direction by the Department

contrary to the above shall not be considered justification for delay or claim by any Prime Contractor.

L. While time is of the essence, each Prime Contractor (as well as each of their subcontractors of any tier) shall not compromise the safety of any individuals while performing any of their work. Contractors shall take all the necessary precautions to maintain safety during the progress of the work including, but not limited to, barricades, signage, safety tape and rails, temporary ramps, temporary partitions, fencing, etc.

M. The detailed Project Schedule will be developed in accordance with the Contract Documents, with the General Contractor being the “Lead” Contractor. The Lead Contractor shall facilitate an initial scheduling meeting with all Prime Contractors, DGS, Professional and Consultants within ten (10) calendar days of receipt of the Letter of Intent to Contract. All other Prime Contractors must provide the required scheduling data for their work to the Lead Contractor within five (5) calendar days of the initial schedule meeting to facilitate the development of the CPM schedule. The Lead Contractor shall facilitate a follow-up scheduling meeting within ten (10) calendar days of the initial schedule meeting (but in no event shall the follow-up meeting occur later than twenty (20) calendar days from the date of the Letter of Intent to Contract) to develop a final draft of the fully integrated Project Schedule. The final fully integrated and detailed Project Schedule, signed by all Prime Contractors, must be submitted for acceptance to the Department within forty-five (45) calendar days from the date of the Letter of Intent to Contract.

N. Pre-installation meetings are required for many items and systems. The pre-installation meetings shall be held the same dates as the regularly scheduled bi-weekly job conferences. Each Prime Contractor shall coordinate with the Department any preinstallation meeting scheduling requirements in order to avoid delays in the installation of any items or systems requiring a pre-installation meeting. Each Prime Contractor requiring a pre-installation meeting to comply with the contract documents, shall request the meeting a minimum of two weeks prior to the scheduled installation of the item or system. Failure to request a pre-installation meeting in the required time period will not relieve the contractors of their responsibility to comply with all contract documents including but not limited to the Project Schedule. No additional compensation or extension of time will be granted by the Department to the contractors for their failure to schedule or attend any of the required pre-installation meetings.

1.7 MILESTONE NARRATIVE

A. The following narrative is intended to assist the Contractors in understanding the potential flow of the work and enumerate some of the critical milestones that shall be incorporated into the Project Schedule.

B. Contractors are advised that the schedule will require multiple crews to work concurrently in the building, and contractors are required to staff and equip the job accordingly.

C. The Milestones noted in this portion of paragraph 1.7 are mandatory and shall be incorporated into the Project Schedule using the timeframes stated below. Conformance with Milestones shall be considered imposed activities with all related predecessors and successors tied to each milestone and the completion date. These activities must be constrained and any recovery plan (if needed) shall not affect any of the milestones established in this section.

D. Any schedule update that indicates that these milestones are slipping must be immediately accompanied by a recovery plan that preserves all the milestone dates.

E. Listing of milestones to be incorporated into the Project Schedule (in addition to the milestones added by each Prime Contractor to develop the schedule), include, but are not limited to the following:

Milestones - Completion of Administrative/Technical Items are the responsibility of the prime contractors and must be completed per the durations outlined in the general conditions:

TASK DESCRIPTION	DAY
1001 - Receipt of Intent to Award	
1002 - Priority Submittal Schedule submitted to the Professional	
1003 - Initial Scheduling Conference by Lead Contractor	
1004 - Critical Submittals to the Professionals: (see para 1.3.A.1 of this section)	
1005 - Return Schedule input from all Primes to Lead Contractor	
1006 - Follow up meeting on schedule (all Prime Contractors)	
1007 - Critical Submittals dispositioned and returned by the Professional	
1008 - Submit Acceptable Project Schedule to Department with all Prime Contractor Signatures	
1009 - Critical Submittals, resubmission if needed to the Professional	
1010 - Resubmitted Critical Submittals dispositioned and returned by the Professional	
1011 -Submission of remaining Technical Submittals	
1012 – Coordination drawings complete for all buildings	

1. Milestones - Completion of Construction Work

TASK DESCRIPTION	DATE
2000 – Project Start	
2001 – Demolition of Administrative Wing Complete	
2002 – Demolition of Kennels Complete	
2003 – Cut in of Temporary Roads Complete	
2004 – Overall Rough Grading Complete	
2005 – Primary Site Utilities Complete	
2006 – Foundations for Physical Education Building Complete	
2007 – Phys Ed building fully enclosed	
2008 – Phys Ed Interior Carpentry & Rough-in Complete	
2009 – Phys Ed Finishes, equipment and fixtures Complete	
2010 – Phys Ed Substantial Completion	
2011 – MAQ Foundations complete	
2012 – MAQ Fully Enclosed	
2013 – Geothermal system complete	
2014 – OTV Pump House Complete	
2015 – MAQ Central Plant Complete	
2016 – MAQ Interior Carpentry & Rough-in Complete	
2017 – MAQ Finishes, equipment and fixtures Complete	
2018 – MAQ Commissioning Complete	
2019 – MAQ Punchlist Complete	
2020 – MAQ Substantial Completion	
2021 – BESO HQ Foundations Complete	
2022 – BESO HQ Enclosed	
2023 – BESO HQ Interior Carpentry & Rough-in Complete	
2024 – BESO HQ Finishes, equipment and fixtures Complete	
2025 – BESO HQ Substantial Completion	
2026 – Stables Complete	
2027 – Demolition of Existing Stables Complete	
2028 – Rough Grading of Auto B&G Area Complete	
2029 – Demolition of Existing Academy Complete	
2030 –Foundations for FTU Complete	
2031 – FTU Fully Enclosed	
2032 – FTU Interior Carpentry & Rough-in Complete	
2033 – FTU Finishes, equipment and fixtures Complete	

2034 – FTU Substantial Completion
2035 – Auto B&G Complete
2036 – Demolition of Existing Auto B&G Complete
2037 – Rough Grading of OTV Area Complete
2038 – Museum Garage Substantial Completion
2039 – Permanent roads, parking lots and site paths Complete
2040 – Final grading and surfacing Complete
2041 – Landscape Complete

The prime contractors are responsible for establishing specific dates for each milestone that will allow the project to be completed within the contract duration.

Milestones shown in italics will be completed by prime contractors working under a separate contract. These milestones must be coordinate between the independent groups of prime contractors.

1.8 FURTHER CLARIFICATIONS

A. By submitting a bid, each Contractor acknowledges that this abbreviated list of milestones for construction work (as provided in this section) was provided for informational purposes, and to ensure all Prime Contractors understand the critical mandatory completions/durations necessary to accommodate the requirements and sequence of completion to meet the needs of the Client Agency. It constitutes a proposed sequence of events based on standard construction practices and will not form the basis for any claims for inefficiency, acceleration or delays. The coordinated Project Schedule will be developed in accordance with this section and the Contract Documents by the Prime Contractors and the actual milestone dates for the project will be agreed upon by all Prime Contractors based on the accepted schedule.

B. If there is a conflict between what is stated in Section 013110 and the General Conditions of the Construction Contact, the contract specifications, the contract drawing or the Administrative Procedures, the most stringent requirement within any of these documents shall prevail.

1.9 PROTECTION OF WORK AREAS

A. All work areas common to the Lead Contractor and any other Prime Contractor shall be protected by the Lead Contractor.

B. Each Prime Contractor shall protect all existing and/or completed equipment and finishes including all provisions for temporary floor and wall protection in the work areas.

C. Where isolated work must be performed outside the partitioned work area, the Prime Contractor performing such work shall provide temporary dust/dirt protection for its work. Those areas shall be cleaned by this Prime Contractor before its employees leave the area each shift.

1.10 SEQUENCING OF CONSTRUCTION AND OTHER REQUIREMENTS

A. The Existing Buildings will be occupied during construction, until such point that the replacement facilities are occupied by the client agency. The Contractors shall adhere to all requirements established by the Department of General Services to minimize impact to the occupants.
    a. The existing academy building, excluding the administrative wing shown for selective demolition, shall remain operational until the client agency has taken beneficial occupancy of the marquee building and the physical education building.
    b. The existing stables building **and associated buildings, including garages,** shall remain operational until the client agency takes beneficial occupancy of the stables and stables garage (Construction of stables and stables garage not in contract). **Package 1 .1 General Contractor to coordinate with Package 2 .1 General Contractor during construction.**

c. The existing Building and Grounds building **and associated buildings, including garages** shall remain operational until the client agency takes beneficial occupancy of the automotive building and grounds building (Construction of Automotive, Building & Grounds building not in contract). **Package 1 .1 General Contractor to coordinate with Package 2 .1 General Contractor during construction.**
d. The existing bureau of special operations headquarters shall remain operational until the client agency takes beneficial occupancy of the BESO building.
e. The existing water tower shall remain operational until such time as the pump house and campus domestic and fire water infrastructure is in place and operational, and no existing buildings remain operationally dependent on the water tower for the provision of domestic or fire water service.

B. The existing buildings listed below are not required to remain operational during construction, and may be demolished by the contractor no later than as required to maintain the critical path of the schedule. The timing of the demolition shall be shown in the master schedule and agreed upon by the Department of General Services in coordination with the client agency. Demolition shall be scheduled so as to further the flexibility of the contractor's means and methods, maintain the critical path, and minimize impact to the building occupants.
   a. Existing academy administrative wing
   b. Academy shoot house
   c. The kennels
   d. The Applehurst Office building (demolition not in contract)

C. **Parking space quantities are to be coordinated with the Pennsylvania State Police, DGS and adjacent property owners, however 50 parking spaces minimum shall be maintained on site for contractor use throughout the duration of construction.**

D. These milestones are intended only to assist the bidders in understanding the potential flow of the work and enumerate some of the critical milestones that will be incorporated into the Project Schedule. The contractors will be responsible for determining the actual order of the required milestones and the logic of the Project Schedule as required to complete the project in the time period indicated in the bid documents.

E. Contractors are advised that the schedule may require multiple crews to work concurrently in areas of the building(s). Multiple areas may be worked concurrently, and contractors are required to supervise, staff and equip the job accordingly. Furthermore, per paragraph D below, multiple independent projects with separate prime contractors will be ongoing simultaneously on the site requiring coordination between contractors as noted in paragraph D below on such matters including, but not limited to, site access, logistics, parking & lay down area, installation of utilities and sequencing of the work.

F. It shall be understood that there may be a number of independent work activities occurring on the site by other means of procurement and by other contractors and vendors outside this project. The other work activities may commence prior to the Final Inspection and/or Closeout Inspection for this project. As such, each prime Contractor shall have an affirmative duty to accommodate this effort while working with and cooperating with all these other entities, individually or collectively, as well as with the Department and Client Agency. The Milestones or items denoted in this section are established to define the anticipated sequence and identify the areas (as well as time frames) that must be completed to facilitate this effort. Each Prime Contractor shall provide the necessary supervision, project management and overall coordination necessary to expedite the work being performed by these other entities. Each Prime Contractor shall consider this condition and include any costs associates with this effort in their bids.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 034500

PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Stipulations:

1. The specifications sections “General Conditions to the Construction Contract”, “Special Conditions” and “Division 01 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. General: Provide architectural precast concrete work as shown on the drawings or as specified in accordance with the requirements of the Contract Documents.

C. Work Not Included

1. Plant and field inspection and testing for concrete.

D. Section Includes, but not limited to, the following:

1. Precast Treads and Risers for **MTLST-02**: Metal Stairs.

E. Related Work Specified Elsewhere

1. Embedded steel connections in concrete are specified in Section 033000 “Cast-In-Place Concrete”.

2. Polished Concrete Finishing as specified in Section 033500 “Polished Concrete Finishing”.

3. Metal stairs as specified in Section 055100 “Metal Stairs”.

4. Sealants and joint fillers are specified in Section 079200 "Joint Sealants".

1.2 REFERENCES

A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict between referenced standards, this specification or within themselves, the more stringent standard or requirement shall govern.

1. American Concrete Institute (ACI)

a. ACI 301: "Specifications for Structural Concrete for Buildings".

b. ACI 318: "Building Code Requirements for Reinforced Concrete".

c. ACI 315: "Details and Detailing of Concrete Reinforcement".

d. ACI 211.1: "Standard Practice for Selecting Proportions for Normal and Heavy Weight Concrete".

e. ACI 304: "Guide for Measuring, Mixing, Transporting and Placing Concrete".

f. ACI 347 "Guide to Formwork for Concrete".

2. American Welding Society (AWS)

a. AWS D1.1: "Structural Welding Code - Steel".

b. AWS D1.4: "Structural Welding Code - Reinforcing Steel".

3. Precast/Prestressed Concrete Institute

a. PCI MNL 117: "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products".

b. PCI MNL 121: "Manual for Structural Design of Architectural Precast Concrete".

c. PCI MNL 122: "Architectural Precast Concrete".

d. PCI MNL 123: "Design and Typical Details of Connections for Precast and Prestressed Concrete".

e. PCI MNL 127: "Recommended Practice for the Erection of Precast Concrete".

4. Concrete Reinforcing Steel Institute (CRSI)

a. CRSI: "Manual of Standard Practice

b. CRSI-WCRSI "Placing Reinforcing Bars".

1.1 **SUBMITTALS**

A. Product Data: Submit for Professional's action. Submit manufacturer's literature, specifications and installation instructions describing the general properties of each material and accessory to be used in the Work.

1. Furnish information for each type of cement, aggregate, admixture, curing and finishing material.

2. Form Release Agent: Furnish data stating that the product will not stain the concrete surfaces and will not adversely affect the bond of subsequently applied finishes.

B. Shop Drawings: Submit for Professional's action. Submit shop drawings for the fabrication and installation of the Work. Prepare details at not less than 3 in. = 1 ft. minimum scale indicating profiles, cross-sections, dimensions, joints and arrangement of units; details of units, anchors, inserts, penetrations and openings, connections to adjoining work or materials, reinforcing for each unit, fabrication tolerances, estimated cambers if applicable, method of installation and anchoring and lifting devices necessary

for handling and erection, as well as the following:

1. Details of each type of connections.

2. Indicate materials utilized for sealing formwork joints and as a form release agent for coordination of subsequent coverings.

3. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware, inserts, connections, and joints, including accessories. Indicate locations and details of anchorage devices to be embedded in other construction.

4. Clearly indicate protective finishes for metal items including connectors.

5. Show separate face and back-up mix locations and thicknesses.

6. Include complete engineering data for fabrication, reinforcement and anchorage, bearing the seal of a licensed Professional Engineer registered in the Commonwealth of Pennsylvania**.**

C. Setting Drawings: Submit for Professional's information. Submit setting drawings and templates for the location of anchorage items that are to be embedded in or anchored to concrete or masonry.

D. Samples: Submit for Professional's action. Label samples to indicate product, characteristics, and location in the Work. Samples will be reviewed for color and appearance only. Furnish sufficient samples to establish the full range of colors and textures for materials exposed in the finished work. Compliance with other requirements is the responsibility of the Contractor.

1. Submit three (3) 18 in. x 18 in. x 2 in. thick samples prior to fabrication of units or construction of mock-up, using same design mix as proposed for the finished work. On back of samples, record mix design, types and locations of aggregates, and type and method of finish. Sample acceptance will be for color, appearance and configuration of aggregate, aggregate distribution and depth of exposure only.

    a. Match **PCFS-01**.

E. Structural Calculations: Submit for Professional's information. Prepare complete design calculations, including loads imposed on structure, prepared, signed and sealed by a Structural or Civil Professional Engineer registered in the Commonwealth of Pennsylvania. Submittals of calculations for permanent parts of the structure will be reviewed only for compliance with stipulated design criteria.

1. Submit structural calculations for connections and panels. Submit engineering calculations to show that maximum deflections do not exceed specified performance requirements under full design loading.

2. Submit calculations of expansion and contraction.

F. Quality Control Submittals: Submit for Professional's information.

1. Test Data: Submit test reports for architectural precast concrete related testing as listed in Paragraph "Quality Control" and as follows:

a. Preliminary Test Reports: Submit 3 copies of test reports directly from Testing Laboratory for each test required in Paragraph "Preliminary Tests" specified under "Quality Control".

2. Certificates

a. Document Review: Before commencing work, submit a written statement signed by the Contractor and the Fabricator/Erector certifying that the Contract Documents, shop drawings and product data have been reviewed with material manufacturers' qualified technical representatives and that they agree the selected materials are proper, compatible with contiguous materials and adequate for the application shown.

b. Concrete Mix Designs: Certified report identifying the design mixes, stating where each mix will be used, the mix proportions, and additional design information including adjustments for seasonality.

c. Mill Certificates: Copies of manufacturer's certificates of mill tests of cement, reinforcing steel, structural steel and embedments.

d. Certification: Certification that precast units conform with sizes and dimensions shown on shop drawings, within the specified fabrication tolerances. Submit certification that erection of units is within the tolerances specified.

e. Admixture Certificates: Submit from each admixture manufacturer certification as to the appropriateness of the use of their admixture(s) in the combination, dosages, batching and construction procedures proposed.

f. Statements of Qualification: Submit the following:

1) Prior to award of Contract, submit the fabricator's and the erector's experience resume.

2) Submit copies of prequalification of welders and other welding procedures in forms as prescribed in AWS "Structural Welding Code".

g. Erection Procedures: Prior to starting Work, submit detailed outline of sequence and methods of erection for architectural precast concrete units including accessories and embedded items. In addition, submit for review, testing and inspection reports required under Paragraph "Quality Control".

h. Remedial Procedures Submit remedial procedures as follows:

1) Submit procedures for the replacement of entire precast units after installation.

2) Submit procedures and materials for the patching and repair of surface blemishes of exposed architectural precast units. Patching of damaged exposed face surfaces may be permitted only when acceptable to the Professional, and only when performed utilizing materials and methods accepted by the

Professional.

1.2 **QUALITY CONTROL**

A. Qualified Installer: The architectural precast concrete work shall be performed by a firm having 5 years of experience in the installation of specified materials on comparable projects. The firm shall have the approval of the architectural precast concrete materials manufacturer. The Installer shall provide evidence of successful completion of work of similar scope to that shown and specified for this Project using similar architectural precast concrete systems.

B. Sole Source Responsibility: Obtain architectural precast concrete from one source of a single fabricator/manufacturer. Obtain accessory products used in conjunction with architectural precast concrete from the architectural precast concrete manufacturer or from sources acceptable to the architectural precast concrete fabricator/manufacturer. The fabricator/manufacturer shall furnish evidence that the specified materials have been fabricator/manufactured by the same source and successfully utilized on a yearly basis for a minimum of 5 years on projects of a similar scope to that shown and specified for this Project.

1. This firm shall be a producer member of the Precast/Prestressed Concrete Institute (PCI) and/or shall participate in its Plant Certification Program.

C. Mock-Ups

1. Visual Mock-Up: Provide mock-up of full sized units; extent as shown on Drawings and matching the finish of the approved sample. Mock-up shall be representative of the finished work. Replace unsatisfactory work as directed. Provide mock-up at the fabricator's plant. After review and acceptance transport mock-up to job site and erect where directed to simulate final condition, complete with sealant, spacers, shims, anchorage, supports and other features of the final work. Mock-up assembly will be used as a standard for judging acceptability of work on Project. The approval of the visual mock-up does not relieve the Contractor of it’s obligation to perform the work in accordance with the Contract Documents.

D. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from authorities.

E. Prefabrication Conference: Prior to the start of fabrication of the architectural precast concrete, meet at the fabricator's plant to review methods and sequence of architectural precast concrete fabrication, special details and conditions, standard of workmanship, testing and quality control requirements, and other pertinent topics related to the fabrication of the architectural precast concrete.

F. Pre-Installation Meeting: Prior to the start of the Work, meet at the Project site to review methods and sequence of architectural precast concrete installation, special details and conditions, standard of workmanship, testing and quality control requirements, job organization and other pertinent topics related to the Work.

1.3 **DELIVERY, STORAGE AND HANDLING**

A. Packing, Shipping, Handling, and Unloading: Transport, store and handle precast units in a manner to avoid undue strains, hair cracks, staining, or other damage. Units shall be

supported on proper dunnage, with edges blocked or otherwise protected. Strapping, hauls or chains shall be protected from direct contact with precast units.

1. Sequencing: Deliver in accordance with schedule and proper setting sequence.

2. Identification Marking: When delivered, each precast member shall bear a number clearly imprinted on an unexposed surface to correspond with an identification piece mark. Piece mark shall include date of casting. Correlate piece marks with test reports and shop drawings.

3. Lifting: Lift and support architectural precast concrete units only at designated lifting or supporting points shown on final shop drawings. Handle units with devices which will not scar or otherwise deface the surfaces of units.

B. Storage and Protection: Store precast units free of the ground and protected from mud or rain splashes adequately supported at blocking points and with identification marks visible. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining materials

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE REQUIREMENTS

A. Design Requirements

1. Detailing: The method of erecting, installing and anchoring of architectural precast concrete indicated on the drawings is diagrammatic only and shall be used for the purposes of bidding. Contractor shall be responsible for design and warranty the structural support, the permanent anchorage, and integrity of architectural precast concrete Work. Alternate methods of detailing, proposed by the Contractor, will be considered provided it complies with aesthetic design shown and performance criteria specified. Design the installation to allow for expansion, contraction and differential deflection of supporting floors of the building structure.

2. The Work of this Section includes, but is not limited to the following

   a. Preparation for architectural precast work including coordinated submittals, mock-ups, and sample installations as specified herein.

   b. Design, fabrication and installation of architectural precast assemblies including embedment plates, connections to building structural framing, panel reinforcement, support and anchorage to building structure.

3. Design, fabrication and installation of architectural precast assemblies, including complete engineered steel support systems and anchorages.

   a. Engineered steel support systems and anchorages are those identified on the drawings and/or required for the exclusive support and anchorage of the precast assemblies.

4. Design Drawings: The Professional's drawings indicate the design concept, the overall size, profile and location of various architectural precast concrete components and, together with the specified "Performance Criteria", tolerances,

materials, finishes and standards, impose the requirements to be conformed to by the Bidder's proposed architectural precast concrete system.

B. Performance Criteria

1. Comply with "Performance Criteria" specified in Section 055100 “Metal Stairs" and additional requirements specified herein.

2. Gravity Loads: Design, fabricate and install architectural precast concrete units so as to support its own weight as well as the weight of elements supported by architectural precast concrete units.

3. The connection system as shown is suggested for the precast installation. Final connection design is the sole responsibility of the Contractor. Coordinate the location of connectors to be cast in architectural precast concrete with connectors to the structure.

4. Design Modifications: Make design modifications of work shown only as may be necessary to meet performance requirements and coordinate the work. Variations in details and materials which do not adversely affect appearance, durability or strength shall be submitted to the Professional for review. Maintain the general design concept without altering profiles, alignments and loads imposed on building structure shown.

2.2 PRECAST FORMWORK MATERIALS

A. Architectural Precast Concrete Formwork

1. General: Comply with ACI 347, “Recommended Practice for Concrete Formwork”, as required to consistently maintain dimensional and surface finish controls specified for tolerances.

2. Architectural Precast Concrete Formwork: Construct forms of non–staining metal, fiberglass reinforced polyester, concrete, or other acceptable materials. Fabricate and reinforce for close control of dimensions and details. Make forms sufficiently rigid so that precast units will meet the casting tolerances. Construct forms tightly to prevent leakage of mortar or paste. Form joints will not be permitted on faces exposed to view in the finished work.

3. Form Release Agent: Non–staining, rust preventative coating which will not adversely affect the bond of subsequent surface coatings to concrete or applied veneers as determined through test panel submittals.

2.3 PRECAST CONCRETE REINFORCING AND METAL ACCESSORIES

A. Reinforcing Bars: ASTM A615 , grade as selected by fabricator. When concrete cover, measured from matrix, is less than 1-1/2 in. or on interior surfaces is less than 3/4 in. , zinc coat bars in accordance with ASTM A767 . Galvanized components shall receive a chromate wash.

1. Reinforcing adjacent to the exposed surface of panels is to be positioned and firmly held in place by hangers, or other means without the use of form-contact bar supports.

B. Supports for Reinforcement: Provide supports for reinforcement including bolsters,

chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing.

1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

C. Welded Wire Reinforcement: ASTM A185 , or ASTM A497 ; hot dipped galvanized in accordance with ASTM A123 . Galvanized articles shall receive a chromate wash.

D. Metal Accessories: Anchors, dowels, cramps, inserts, clip angles, anchor plates, shims, washers, setting loops, lifting hook inserts, and other fastening devices and accessories as necessary for erection and support of precast units. Supports and anchorages shown on Drawings, if any, are conceptual. Contractor is solely responsible for the design and installation of proper supports and anchorages. Provide accessory items fabricated from steel, hot dipped zinc coated in accordance with ASTM A123 . Fastening devices, located at inside face of assemblies and welded during erection shall be steel, prime painted as specified herein. Accessories with threaded portions shall be zinc or cadmium electroplated. Provide the following:

1. Structural Steel Shapes: ASTM A36 .

2. Steel Plates: ASTM A283 , Grade C.

3. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27 . Provide bolts, washers and shims as required, hot dip galvanized.

2.4 CONCRETE MATERIALS

A. General

1. Obtain cement, aggregates and water from a single source, sufficient to complete the entire work and to assure regularity of appearance and uniformity of color. Color of cement and aggregates is specified in Paragraph "Mixes".

2. The maximum soluble chloride (Cl) ion content shall be 0.15% expressed as percentage of weight of cement in hardened precast concrete contributed from ingredients used to produce the precast concrete. Architectural precast concrete with excess chlorides will be subject to removal.

3. The total sulfate (as SO_3) content of the entire mix shall not exceed 0.50% of the weight of cement. Architectural precast concrete with excess sulfates will be subject to removal.

B. Portland Cement (Backup): ASTM C150, Type I or Type III. The alkali content shall not exceed 0.6% unless:

1. The manufacturer certifies that no alkali reactivity is produced with the proposed combination of materials when tested in accordance with ASTM C227, or

2. A pozzolan, proven by ASTM C441 to be effective in preventing excessive expansion due to alkali-aggregate reaction, is included in the mix.

C. Non-Staining Portland Cement (Face Mix): ASTM C150, Type I or Type III; The alkali content shall not exceed 0.6% unless the manufacturer certifies that no alkali reactivity is

produced with the proposed combination of materials when tested in accordance with ASTM C227, or a pozzolan, proven by ASTM C441 to be effective in preventing excessive expansion due to alkali-aggregate reaction, is included in the mix. Provide one of the following:

1. "Lehigh White Portland Cement Type I" (Lehigh Portland Cement Co.).

2. "Lehigh Brand High Early Strength White Portland Cement Type III" (Lehigh Portland Cement Co.).

3. "Federal White Type I" (LaFarge Corporation.).

D. Aggregates: ASTM C33, except that weight loss shall not exceed 15% when subjected to ASTM C88 sodium sulfate soundness test. Color consistency and size limit for face mix as required to match adjacent floor, **PCFS-01**. When tested under ASTM C641, Test for Staining Materials, "Visual Classification Method" extent and intensity of stain shall have a stain index of less than 20.

E. Admixtures: Calcium chloride and thiocyanates are not permitted. Provide only those admixtures which produce no detrimental effects on metal components. Admixtures, which when combined with other ingredients used to produce the concrete shall result in concrete having not more than the specified limits for soluble chloride ion content.

1. Each admixture manufacturer shall certify to the appropriateness of the use of their admixture(s) in the combination, dosages, batching and construction procedures proposed. Architectural precast concrete shall contain a water reducing admixture.

2. Air-Entraining: Comply with ASTM C260 certified by manufacturer to be compatible with other required admixtures.; providing one of the following:

   a. "MB-VR" (Master Builders Co.).

   b. "Daravair" (Construction Products Div., W.R. Grace & Co.).

   c. "Sika-Aer" (Sika Corp.).

   d. "Air-Mix" (Euclid Chemical Co.).

3. Water Reducing (Plasticizing): Comply with ASTM C494 , Type A; provide one of the following:

   a. "WRDA with Hycol" (Construction Products Division, W.R. Grace & Co.).

   b. "Eucon WR-75" (Euclid Chemical Co.).

   c. "Pozzolith 322N" (Master Builders Co.).

   d. "Plastocrete 161" (Sika Chemical Corp.).

4. Fly Ash Admixture: ASTM C 618, Class C or F.

5. Silica Fume Admixture: ASTM C 1240.

6. Other Admixtures: Use only with the prior written approval of the Professional. Do

not use admixtures which contain chlorides.

F. Pigments: Not Permitted.

G. Pigments: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant

H. Water: Potable, free from foreign materials in amounts that may stain or are harmful to architectural precast concrete and embedded steel and in compliance with PCI MNL-117, Division II, Section 2.1.2.3 and ACI 301, Chapter 2, Paragraph 2.3.

2.5 MISCELLANEOUS MATERIALS

A. Welding Electrodes: Comply with the provisions of AWS specifications A5.1, A5.5, A5.17, A5.18, A5.20 as applicable.

B. Slip Gaskets: Provide at bolted slip-joints: "#50 Eel-Slip Pads" Scan PAC Industrial Sales or approved equal.

C. Shims: Plastic as recommended by fabricator.

D. Reglets: Stainless steel, Type 304, 0.019 in. thick, mill finish.

E. Paint

1. Ferrous Metal Primer: Provide primer as supplied by a single manufacturer for the entire project. Of the respective dry film mil thickness specified; one of the following:

   a. "Hi-Build Epoxoline II Series N69" (Tnemec Co. Inc.); 4.0 - 6.0 mils d.f.t.

   b. "Carboguard 888 Series" (Carboline Co.); 4.0 - 6.0 mils d.f.t.

   c. “Interseal 670HS (International Paint), 4.0-8.0 mils min d.f.t.

2. Dielectric Separator: Cold applied, asphalt emulsion type complying with ASTM D1187, non-sagging, resistant to severe corrosion conditions; applied in two coats for an overall minimum dry film thickness of 25 mils or heavy coating of epoxy paint in minimum 2.0 mil dry film thickness.

3. Galvanizing Repair Paint: Zinc rich paint for repairing galvanized surfaces and field welds.

F. Grout: Free of gas producing or gas releasing agents, oxidizing catalysts, inorganic accelerators and chlorides. Comply with ASTM C1107. If requested, grout a sample 4 ft. x 4 ft. x 2 in. plate in the field and demonstrate a minimum of 95% bearing after curing 14 days. Cure grout in accordance with manufacturer's instructions. Provide one of the following:

1. "Five Star Grout" (U.S. Grout Corp.).

2. "Masterflow 713 Plus" (Master Builders Co.).

3. "Euco NS" (Euclid Chemical Co.).

2.6 ENGINEERED STEEL SUPPORT SYSTEMS AND ANCHORAGES

A. General:

1. Engineered supports and anchorage for architectural precast concrete shall be provided.

2. The support and connection systems shown are suggested, as defined below, for the precast installation. In each case the complete final design, including connections is the responsibility of the single subcontractor providing architectural precast work and thereafter to the Contractor for acceptance and inclusion into the Project.

   a. Gravity anchors shall be provided at locations and in quantities shown, or if not shown not less than two per precast component.

   b. Connections shall be provided generally as shown. Minimum quantities are indicated, additional connections may be included by the precast fabricator as required to facilitate maintaining precast component thickness and performance.

B. Bolts: High strength bolts, nuts and washers shall comply with the provisions of:

1. ASTM A325 and A490 .

2. AISC specification for "Assembly of Structural Joints Using High Strength Bolts."

C. Paint System for Steel Support System: Provide primer as specified herein.

2.7 ARCHITECTURAL PRECAST CONCRETE MIX DESIGN

A. General: Review requirements relative to slump, seasonal variation of admixtures and anticipated conditions in the Work, before formulating the design mixes. Provide separate design mixes for each anticipated or actual change in the type or proportion of basic materials, including admixtures and change in slump limits. Allow at least 6 weeks of lead time for testing and verification of mix designs, and so that mixes can be reviewed by the Professional prior to use in the Work. File the mix designs in the precast fabricator's office after review by Professional and prior to commencement of casting operations.

B. Proportioning: Provide in accordance with ACI 211.1 requirements. Produce normal weight concrete of the type and strength indicated,

C. Adjust design mix as required to obtain the strength specified and matching the adjacent floor, **PCFS-01**, for color, texture and gradation of exposed aggregate. Limit use of fly ash and silica fume to not exceed, in aggregate, 25% of Portland cement by weight.

D. Properties of Mix

1. Compressive Strength: 5000 psi minimum at 28 days.

2. Slump: 3 in.maximum.

3. Water: 5-1/2 gal.per bag of cement maximum.

4. Cement: 5-1/2 bags minimum per $yd.^3$ of concrete.

5. Total Air Content: Not less than 4% nor more than 6%.

6. Water Absorption: Not to exceed 3% to 4% by weight or 8% to 10% by volume whichever is less.

7. Air Entraining Admixture: ACI 301, Chapter 3, Paragraph 3.4, determined by volume as per ASTM C173 or ASTM C231.

E. Single facing mix design shall be prepared using Portland cement and aggregate hereinbefore specified for facing for those assemblies in which more than one major face (edge) is exposed. Facing mix may be used to return typical thickness of panels not greater than 8 in., unless otherwise accepted by Professional subject to full size mock-up.

F. Where only one face of a precast component is exposed, at the fabricator's option either of the following mix design/casting techniques:

1. A single design mix throughout the entire thickness or panel, using Portland cement and aggregate hereinbefore specified for facing.

2. Design mixes for facing and back-up which will be placed consecutively in the panel form. Facing mix shall use Portland cement and aggregate hereinbefore specified for facing, back-up mix shall use Portland cement and aggregate complying with criteria specified as selected by the fabricator subject to Professional's review.

a. Facing and back-up mixes shall be designed and placed so as to result in a single monolithic panel construction.

b. Depth of facing shall be 1-3/4 in.minimum.

c. Water-Cement and cement-aggregate ratios of face and backup mixes shall be similar.

2.8 PLANT MIXED CONCRETE

A. Batching Unit: Mix concrete by a mechanical batch type mixing plant with facilities for accurate measurement and control of each material entering mixer and for changing proportions to conform to varying conditions of Work. Provide for adequate inspection at all times. Obtain approval from Department’s Testing Laboratory for plant and its location.

1. Weighing Unit: For each type material to show scale load at convenient stages of weighing operation. When directed, check weighing units in presence of Department’s Testing Laboratory. When required, adjust before further use.

2. Water Mechanism: Tight, with valves interlocked so that discharge valves cannot be opened before filling valve is fully closed. Fit with graduated gauge.

3. Discharge Gate: Control mix to produce ribboning, mixing of cement with aggregate. Deliver materials from batching equipment to mixer, accurate by weight within 1/2% for cement, 1-1/2% for water, 1% for fine aggregate, and 2% for coarse aggregate.

B. Mixing: Do not charge mixers over rated capacity or operate above rated speed. Excessive mixing, requiring addition of water to preserve required consistency is not

permitted. Discharge entire batch before recharging. Measure mixing time from instant water is introduced into drum containing solids. Introduce all mixing water before 1/4 of mixing time has elapsed. Mixing time of 1-1/2 minutes or until mass is uniform and homogeneous. Use mixer of capacity to handle one or more full sack batches.

2.9 FORMING

A. General: Forms and casting beds shall be firmly seated so as not to deflect or be displaced under concreting or tensioning loads. Correct for thermally induced strains or forces.

1. Form member penetrations larger than 6 in.. Coring or field cutting is not permitted unless prearranged with the Professional.

2. Clean and coat forms with release agent prior to installation of reinforcing or embedments.

3. Vent and drain internal void forms.

2.10 FABRICATION

A. Forms: Accurately construct of non-staining metal, fiberglass reinforced polyester, concrete, or other approved materials of sufficient strength to withstand pressures due to concrete-placing operations and temperature changes. Fabricate and reinforce for close control of dimensions and details. Make forms sufficiently rigid so that precast units will meet the casting tolerances. Construct forms tightly to prevent leakage of mortar or paste. Form joints will not be permitted on faces exposed to view in the finished work.

B. Reinforcement

1. General: Place reinforcement in accordance with properly executed placement drawings. Embedments, inserts and lifting devices shall be firmly anchored to resist misplacement during concreting.

2. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. Place welded wire and reinforcing bars of size and spacings as required to resist shrinkage, temperature and handling stresses and to achieve performance criteria, design requirements and in accordance with properly executed placement drawings. Support and space reinforcement using high density polyethylene devices to ensure that it will remain positioned in the precast units as required. Keep support devices at least 1/2 in.back from surfaces. Keep reinforcement a minimum of 3/4 in.from the edges and surfaces of the units. Assemble contiguous reinforcement as a single assembly (cage) prior to placing in forms.

3. Tolerances: Tolerances for placement of reinforcing and other embedments shall be in accordance with PCI MNL–116.

C. Accessories: Place inserts and other anchoring and lifting devices accurately and securely in forms. Weld accessories to the reinforcement, unless materials are not weldable, in which case secure with stainless steel tie wire. Do not place handling inserts on finished surfaces of precast units. Coordinate with other trades for installation of cast-in items.

2.11 ARCHITECTURAL CONCRETE PLACING AND FINISHING

A. Mixing and Placing

1. Mix concrete to distribute fine and coarse aggregate evenly throughout. Place concrete so as to prevent segregation in the forms. Utilize face mix in areas which shall be exposed to view in the finish work, including sides and edges.

2. Place face mix to a minimum thickness after consolidation of the greater of 1 in. or 1.5 times the maximum aggregate size, but not less than the minimum reinforcement cover. Place back-up concrete to ensure bond with face concrete.

3. Place concrete in a continuous operation to prevent seams or planes of weakness from developing in precast units. Comply with requirements of MNL-117 for measuring, mixing, transporting, and placing concrete.

4. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with MNL-117.

5. Where casting corner units, units with transitions which are less than 90-degree angle transitions and large irregular shaped units, take special care in casting and handling as required to achieve uniformity and quality control. Provide forms which allow for casting of shapes with slightly eased edges, unless otherwise shown or specified.

B. Curing: Retain moisture to assure complete hydration of the cement and until concrete has obtained at least 70% of its design strength. Membrane forming curing compounds shall not be used.

1. Where “Moist Curing” is required, use a waterproof covering equivalent to ASTM C171, or use burlap frequently wetted except during freezing temperatures.

2. Where “Steam Curing” is required, do not apply steam until concrete undergoes initial set (2 to 4 hours). Heat gain in enclosure, maximum 40^{o}F per hr. Maximum heat in enclosure, 150^{o}F.

C. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F.. Fabrication and erection procedures shall take into account the ambient temperature range at the time of respective operations.

D. Shop Painting Steel Support Systems

1. Shop paint steel support system and other ferrous metals, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, unless otherwise specified.

2. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning", prior to additional surface preparation specified.

3. Clean and prepare metal surfaces before applying shop coat. Remove rust and mill scale in accordance with SSPC SP-3 "Power Tool Cleaning".

4. Immediately after surface preparation, apply primer in accordance with manufacturer's instructions. Use painting methods which will result in full coverage and dry film thickness specified.

5. Apply one shop coat of primer to steel support systems, except apply 2 coats of primer to surfaces inaccessible after assembly or erection. Change color of second or finish coat to distinguish it from the first coat.

2.12 SURFACE TREATMENT

A. General

1. Finish surfaces exposed to view to match approved mock-up panels. Provide smooth joints, square edged, struck back and sealed.

B. Finish: Polished to match adjacent floor, **PCFS-01**

2.13 REPAIR, ARCHITECTURAL PRECAST CONCRETE

A. Patching of exposed surfaces is not permitted, except as acceptable to Professional. Patches shall be indistinguishable from the surrounding area.

B. Before commencing any repairs, the Contractor shall establish by trial mix, a formula for the patching of the finish. The Contractor shall demonstrate his patching techniques on sample panels or, if required, the mock-up. Such techniques and their results shall be to the entire satisfaction of the Professional before patching may commence on the architectural precast concrete units.

2.14 CLEANING AND SEALING, ARCHITECTURAL PRECAST CONCRETE

A. Cleaning: Surfaces which are to be sealed shall be cleaned with water or a liquid cleaner as required. All surfaces shall be thoroughly rinsed to remove all cleaning solution and allowed to dry before application of sealer. Liquid cleaners shall be applied in strict accordance with the manufacturer's instructions including protective measures.

B. Sealing: Clean the surfaces to be sealed and make free of dirt, dust, and other foreign material immediately prior to application of the sealer. Provide specified penetrating silane water-repellent sealer on exposed surfaces of concrete and apply undiluted in accordance with manufacturer's recommendations.

2.15 TOLERANCES

A. Casting Tolerances: As required to achieve erection tolerances and as follows:

1. Overall Height and Width

a. 10 ft. or under +/- 1/8 in.

2. Plane of the Side Mold 1/16 in. per 6 in. in depth

3. Thickness +/- 1/8 in.

4. Out of Square (difference in length of the two diagonal measurements) 1/8 in. per 6 ft , but not more than 1/4 in.

B. After Casting Tolerances

1.	Bowing and Warping without intermediate support	1/240 panel dimension
2.	Bowing and Warping with intermediate support	1/360 panel dimension

2.16 **SOURCE QUALITY CONTROL**

A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.

B. Preliminary Tests: The Contractor shall engage a testing laboratory acceptable to the Professional to establish the suitability of materials to be used in architectural precast concrete prior to the beginning of casting operations. Costs in connection with tests shall be included in the Contract Price. Furnish test reports to the Professional. Include the following Preliminary tests:

1. Establish a design mix in accordance with the requirements of these Specifications, and with preliminary test procedures as described in ACI 301, Chapter 3, Paragraph 3.8 and Paragraph 3.9.

2. Soundness tests on coarse aggregate in accordance with ASTM C88.

3. Staining tests on fine and coarse aggregates in accordance with ASTM C641.

4. Petrographic analysis of coarse aggregate in accordance with ASTM C295.

5. Water absorption test in accordance with PCI MNL 117, Appendix D, Division II, Section 2.1.2 (9)(b).

6. In addition to the tests required to establish the suitability of materials, perform the following:

   a. Make one test for each design mix to verify that the total water soluble chloride (Cl) ion content expressed as percent by weight of cement in hardened concrete contributed from all ingredients used to produce the concrete is within the specified limits. Perform chloride tests in accordance with ASTM C1152

   b. Make one test for each design mix to verify that the total sulfate (SO_3) content of each mix is within the specified limits. Perform sulfate (SO_3) tests in accordance with ASTM C114.

7. Strand Tensioning Reports: Record strand size, number and grade, initial stress, final stress, elongation, elongation and/or stress corrections, and physical condition of stranding for elements cast. Report pertinent data including strand failures, splicing and/or excessive slippage.

8. Camber and Straightness: Measure and record camber and/or straightness of prestressed members after release from restraint but within 24 hours after transfer of prestressing forces. Measure and record camber growth or loss of straightness once each day until change is less than 10%. Measure camber and/or straightness of first 10 units of each type of element cast and every fourth one thereafter. Identify elements measured, dates, initial and subsequent

readings, and conditions as temperature, storage loads, or quality control affecting camber and/or straightness.

PART 3 - EXECUTION

3.1 GENERAL

A. Manufacturer's Instructions: Prepare substrates and erect the work of this Section, including equipment, components, and accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified, and where project conditions require extra precautions or provisions to ensure satisfactory performance of the Work.

3.2 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Substrate Acceptability: Commencement of installation shall constitute acceptance of substrate conditions by the Installer.

3.4 INSTALLATION

A. General: Set units level, plumb and true to line with uniform joint widths. Erect units in accordance with final shop drawings and erection schedules. Provide and maintain temporary supports and bracing as required to maintain position, stability and alignment as units are being permanently connected, anchored or secured. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses. Remove projecting hoisting devices and cement-grout fill recessed hoisting devices.

B. Adjustment and Correction: Compensate and correct for misaligning effect of temperature, draw from welding, bolting or erection sequence.

C. Anchorage: Anchor architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated. Remove temporary shims, wedges, and spacers as soon as possible after anchoring and grouting are completed.

D. Welding: Perform welding in compliance with AWS D1.1 and AWS D1.4, with qualified welders.

1. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.

2. Repair damaged steel surfaces by cleaning and applying a coat of specified primer (and finish coat) and\or galvanizing repair paint to galvanized surfaces.

E. Fastening Devices: Provide metal anchors, inserts, clips, anchor plates, shims, bolts, and other fastening devices as detailed and as necessary for erection and support of precast units. Furnish inserts and attachment devices to other trades to avoid delays in the

progress of the Work. Support and anchorage shown on Drawings are minimum.

F. Erection Tolerances: Comply with the following erection tolerances:

1.	Variation from plumb	+/- 1/8 in. in any 20 ft. run or story height; noncumulative.
2.	Variation from level slopes	+/- 1/8 in. in any bay or 20 ft. maximum; or noncumulative.
3.	Panel alignment	+/- 1/8 in. jog in alignment of edge.
4.	Variation from linear lines from established position in plan	+/- 1/4 in. in any bay or 20 ft. maximum; building noncumulative.
5.	Variation of anchors and fasteners from established position in plan	+/- 1/4 in.
6.	Face width of joints wide or greater.	+/- 1/8 in. for joints 1/2 in.

G. Field cutting of precast elements shall not be permitted without acceptance of Professional.

3.5 CONNECTIONS

A. Connections shall be designed and detailed by the fabricator under the direction of a licensed Professional Engineer registered in the Commonwealth of Pennsylvania**.**

B. Bolting

1. Tighten bolts beyond snug gradually and in sequence to avoid local overstressing of concrete.

2. When high strength bolts are used, the AISC specifications shall apply including values as noted therein. Tighten high strength bolts to one turn beyond snug and nick threads to prevent backoff.

C. No combination of bolts and welds shall be used for stress transmission in the same faying face of any connection.

D. Welding, filler metal, welding techniques and procedures shall be in accordance with AISC specification for the "Design, Fabrication and Erection of Structural Steel for Buildings," and AWS "Structural Welding Code," "Filler Metal Specifications," and "Arc and Gas Welding in Building Construction."

1. Do not weld until adjacent elements to be connected have been aligned, firmly seated and braced. Control heat build-up by limiting voltage, electrode size, and rate. Spalled or heat damaged concrete around weldments is not acceptable.

2. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.

3.6 FIELD PAINTING

A. Touch-Up Painting of Metal Surfaces:

1. After erection in the field, touch-up marred and abraded galvanized surfaces with the specified paint in accordance with ASTM A780. Touch up surfaces that have received shop applied ferrous metal primer using surface preparation and paint system as recommended by the manufacturer of the ferrous metal primer.

2. Surfaces requiring touch-up painting shall be cleaned and primed as soon as practicable after erection and before excessive rusting or other damage occurs to surfaces from weather or other exposure.

3. Touch up bolted connections with zinc rich paint. Heads of bolts, surfaces which are unpainted because of welding, field connections and other areas on which the shop coat has been abraded or otherwise damaged shall be touched up after erection.

3.7 FIELD CUTTING

A. Field cutting of holes may be done only with the Professional's acceptance, the consent of the precast contractor and only with power saws or core drills.

B. Cracks, spalls and sharp corners created by field cutting are to be ground, eased, and patched with epoxy type bonding and patching compounds.

3.8 FIELD QUALITY CONTROL

A. Contractor’s Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.

3.9 DEPARTMENT’S QUALITY ASSURANCE SERVICES

A. Quality Assurance Services: Independent Testing and Inspection Agency(ies), engaged at the Department’s expense through the Professional, will perform the following activities to monitor the Contractor’s Quality Control Services. The Department's Quality Assurance Services monitoring of activities do not relieve the Contractor of responsibilities under the Contract.

B. Contractor's Assistance to the Quality Assurance Services: Furnish the Department's Quality Assurance Services with access to the Work, materials and facilities as required by the Agency(ies). Provide adequate notice of construction activities to allow timely inspections and observation of Contractor tests, and be available for pre-installation meetings. Furnish the Department's Testing and Inspection Agency(ies), with on-site office facilities.

C. Scope of Work by the Department’s Testing Agency: The agency will be responsible for conducting and interpreting testing; inspecting fabrication facilities and operations; inspecting installation; compiling and submitting test reports and statements in each report attesting whether or not the work complies with requirements of the Contract Documents; specifically noting deviations. Cooperate with the testing and inspection agency to facilitate their work including the furnishing of test samples as requested.

D. Examination and Acceptance

1. Tolerances: Before delivery, the Department's Testing Agency shall examine and measure units to establish conformity with sizes and dimensions shown on shop drawings. Units whose dimension vary in excess of specified tolerances are unacceptable and will be rejected.

2. Imperfections: The Contractor shall discard and replace units which are cracked, chipped, stained or otherwise damaged. Patched units are not acceptable, except in specific instances when approved by the Professional, the unit may be repaired. The Professional reserves the right to reject unit if it does not match the approved visual mock-up.

E. The Contractor shall be responsible for the testing and/or inspection resulting as a consequence of the following:

1. Work not evidencing compliance with this Specification.

2. Testing above and beyond that required such as additional cylinders for early breaks, etc.

3. Testing to verify the adequacy of work done without prior notice, without proper supervision, or contrary to standard construction practice.

3.10 PATCHING

A. Replace unit which exhibits damage to surfaces, finish, corners or edges which will be exposed to view after erection, or which is broken or cracked due to shrinkage, transportation, handling or erection, except that in specific instances when accepted by the Professional, the unit may be repaired in place in accordance with accepted submitted remedial procedures.

B. Repairs shall be limited to minor repair of surface or edge damage and are subject to acceptance by the Professional. Major repairs shall not be attempted until an engineering evaluation is made by a Professional Engineer, to determine whether the unit will be structurally sound.

C. Personnel from the architectural precast concrete plant, experienced in making job site repairs, shall be responsible for making, directing or supervising repairs.

D. Acceptance of repaired units by the Professional is contingent upon the repairs being done skillfully so as to be sound, permanent, flush with adjacent surfaces and of color and texture matching adjoining surfaces and showing no apparent line of demarcation between original and repaired work. The Professional's decision will be final with respect to acceptance or rejection of patched units.

3.11 CLEANING

A. Upon completion of the work thoroughly clean precast units, after erection to remove weld marks, other markings, dirt, and stains, starting at the top, by scrubbing with a solution of soap powder, using stiff fiber brushes, followed by a thorough rinsing with clean water.

B. Do not use cleaning materials or processes that could change the appearance of exposed architectural precast concrete finishes.

3.12 PROTECTION

A. Protect and maintain the precast work through the construction period so that it will be without indication of wear or damage at the time of preliminary acceptance by the Department. During construction, protect exposed tops of units in place at end of each day's work and in bad weather. After erection, protect units adjacent to materials handling hoists and entrances. Normal weathering of exposed work is permitted during the construction period if other construction activities or conditions do not interfere and result in an unacceptable condition of the work at the time of preliminary acceptance by the Department.

END OF SECTION

SECTION 066400

PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Stipulations:

1. The specifications sections “General Conditions to the Construction Contract”, “Special Conditions” and “Division 01 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. General: Provide in accordance with requirements of the Contract Documents.

C. Section Includes the Following:

1. PFI-1A-1J: FAUX POLYURETHANE COMPOSITE WALL PANELS

2. PFI-02A-02E: FAUX POLYURETHANE COMPOSITE TRIM CORNICE PANELS

3. PFI-03A-03C: FAUX POLYURETHANE COMPOSITE TRIM PANELS

4. PFI-04A-04B: FAUX WOOD SHUTTER: PT-34, PT-38

5. PFI-05: FAUX WOOD SHUTTER

6. PFI-06: FAUX WOOD PANEL PT:38

7. PFI-07: FAUX WOOD PANEL PT-38/34

8. PFI-08: FAUX WOOD PANEL PT-42

D. Related Requirements:

1. Section 05120 – Structural Steel: Attachment framing

2. Section 06100 – Rough Carpentry: Framing of opening and blocking.

3. Section 06400 – Architectural Woodwork

4. Section 07900 – Joint sealants and field applied sealants.

1.2 REFERENCES

A. General: Comply with the applicable provisions and recommendations of references, except as modified by governing codes and by the Contract Documents. Where a recommendation or suggestion occurs in the references, such recommendation or suggestion shall be considered mandatory. In the event of conflict between references, this specification or within themselves, the more stringent standard or requirement shall govern.

B. Reference Standards:

1. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

2. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

3. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

4. American Composites Manufacturers Association (ACMA)

   a. Guidelines and Recommended Practices for Fiber – Reinforced-Polymer (FRP) Architectural Products

   b. Basic Composites Manual ACMA 2021

5. ASTM International

   a. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

   b. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction

   c. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials

   d. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics

   e. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics

   f. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

   g. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements: Provide simulated finish products, panels and trim which have been manufactured, fabricated and installed to maintain performance criteria in this specification without defects, damage or failure.

1.4 DESIGN REQUIREMENTS

A. Plastic Fabrications shall be designed as a self-supporting structures with integral framing system. No additional skeleton structural framing shall be required to support the items.

B. Installed plastic fabrication items and fastening systems shall be designed, engineered, fabricated, and installed to conform to the state codes, local codes, and the Professional's design.

C. Fire Resistance Ratings of Plastic Fabrications: Provide materials and assemblies that have been tested and comply with the following fire test performance criteria as determined by an independent testing laboratory acceptable to the authorities having jurisdiction. Tests shall include veneer (including specified finishes), core materials and panel balancing materials. Composite assembly when tested in accordance with ASTM E84, 'Unadhered Method', (fully exposed to burn chamber of testing equipment) shall comply with the following:

ASTM E-84 Class A Fire Rating:

Flame Spread: 25 or less.

Smoke Developed: 450 or less

PART 2 - PRODUCTS

1.1 SUBMITTALS

A. Product Data*:* Submit, for Professional's action, manufacturer's product data for each type of product and process specified in this section and incorporated into items during fabrication, finishing, and installation.

B. Shop Drawings: Include plans, elevations, sections, profiles, and details of sections. Illustrate dimensions, adjacent construction, materials, thickness, fabrications details, required clearances, field jointing, colors, finishes, methods of support, attachments, anchorage to substrates, integration of components, and list of part numbers that coordinate with labeled parts.

C. Show any locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcing specified elsewhere, if necessary.

D. Professional Engineering, if required, shall include calculations and stamped drawings by P.E. registered in the state of Pennsylvania, to meet all state and local codes.

E. Provide a list of projects demonstrating the capability of manufacturing items comparable in size, scope, and complexity as indicated.

F. Samples: Submit for Professional's action Label samples to indicate product, characteristics, and location in the Work. Samples will be reviewed for color and appearance only. Furnish sufficient samples to establish the full range of colors and textures for materials exposed in the finished work. Compliance with other requirements is the responsibility of the Contractor. Submit samples of each of the following items:
1. Panels: 12 inch square, full thickness, for each color, pattern, type, and surface finish.
2. Trim: 12" long, full height and thickness, with final formed edges.
3. Large Item: 12 inch square finish material panel
4. Available Grout/Sealant/Joint colors

G. Quality Control Submittals: Submit for Professional's information.

1. Test Reports

a. Performance Test Reports for Composite Panels: Submit the following test reports showing compliance with required performance and testing criteria, from an independent testing laboratory:

1) Flame spread and smoke developed ratings for each type of panel when tested when tested in accordance with ASTM E84, Unadhered Method', (fully exposed to burn chamber of testing equipment).

2) Average Mechanical Properties:
   a. Tensile strength
   b. Flexural strength
   c. Flexural modulus
   d. Compressive strength
   e. Bearing strength
   f. Thermal expansion
   g. Specific gravity
   h. Water Absorption:
   i. Density
   j. Weight
   k.

1. Certifications

   a. Document Review: Before commencing work, submit a written statement signed by the Contractor and the Installer certifying that the Contract Documents, shop drawings and product data have been reviewed with appropriate material manufacturers' qualified technical representatives and that they agree the selected materials are proper, compatible with contiguous materials and adequate for the application shown

   b. Certification of Fire Retardant Treatment:

      Submit certification that assemblies specified as fire rated comply with Underwriters' Laboratory Class 1 rating and these Specifications.

2. Closeout Submittals: Submit documentation.

   a. Warranties: Special warranties as specified.

   b. Maintenance Manuals: Two (2) complete manuals describing the materials, and procedures to be followed in cleaning and maintaining the Work. Include manufacturers' brochures and lists describing actual materials used in the Work.

2.2 QUALITY ASSURANCE

A. Qualified Installer: The Work shall be performed by a firm having 5 years of experience in the installation of specified materials on comparable projects. The firm shall have the approval of the manufacturer. The installer shall provide evidence of successful completion of work of similar scope to that shown and specified for this Project using similar systems.

B. Sole Source Responsibility: Obtain items from one source of a single manufacturer. Obtain accessory products used in conjunction with Work from the manufacturer or from sources acceptable to the manufacturer. The manufacturer shall furnish evidence that the specified materials have been manufactured by the same source and successfully utilized on a yearly

basis for a minimum of 5 years on projects of a similar scope to that shown and specified for this Project.

C. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from such authorities.

D. Visual Mock-Ups

1. Provide visual mock-ups of the following items consisting of all the specified components of sizes as shown:

   a. (1) PFI-1 any type Full Height x 4ft Wide x Full Assembly depth, include associated items from PFI-02

   b. (1) PFI-03 – Any type, Full size, Decorative Panel

   c. (1) PFI-04 – Faux Wood Shutter – Full size

   d. (1) PFI-06 – Faux Wood Panel – Full Size

2. Locate the mock-ups where directed. Provide lighting of similar type and level as that of final installation for viewing. Demonstrate the proposed range of aesthetic effects and workmanship. Alter or revise mock-ups, as directed, to obtain the acceptance of the Department and the Professional.

3. The accepted mock-ups shall serve as a standard of quality for specified item(s) for the project and may remain as a permanent part of the Work if in same condition as new at time of final acceptance. The approval of the mock-ups does not relieve the Contractor of its obligation to perform the work in accordance with the Contract Documents.

E. Pre-Installation Meeting: Prior to the installation of the Work, meet at the project site to review the material selections, substrate preparations, installation procedures, coordination with other trades, special details and conditions, standard of workmanship, and other pertinent topics related to the Work.

2.3 DELIVERY, STORAGE AND HANDLING

A. Handle, store and transport items according to Manufacturer's recommendations and in a manner that prevents damage.

B. Protect from damage by retaining any shipping protection and store covered in a secure place with non-staining protective wrapping until installation.

2.4 WARRANTY

A. General: Warranties and guaranties specified in this Article shall not deprive the Department of other rights the Department may have under other provisions of the Contract Documents and are in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit for Department's documentation. Furnish 1 year written warranty in form stipulated by the Professional, signed by the Contractor and Installer, agreeing to repair or replace Work which has failed as a result of defects in materials or workmanship. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of the Department. Other guarantees or warranties may not be substituted by the Contractor for the terms of this special warranty.

PART 3 - PRODUCTS

3.1 POLYURETHANE PANELS

A. General:

1. Panels are to be closed cell structure.
2. Surface layer is a durable impact resistant plastic to prevent impact resistance.
3. UV coated for UV protection.
4. Fasten with screws and construction adhesive in every joint
5. Apply texture caulking and paint touch up to all screw locations
6. Size: Provide largest size sheet size available to limit joints
7. Provide interlocking panels to limit straight joints on elevations.
8. All Joints should be butt joints on straight runs and mitered joints in corners.
9. Include additional shimming and trimming for alignment where required.
10. Meet Fire Resistance Rating
11. Tolerance:

Part Thickness: + or – 1/8 inch.
Length: + or – 1/8 inch.
Variation from Square: 1/8 inch.
Hardware Location Variation: + or – ¼ inch.

B. Schedule:

See drawings for details and dimensions:

EXTERIOR FINISH PANELS:

- Approx. 4ft x 8ft x 1.5 minimum thick panels used as wall finishes
- Grout color: BOD: Latte (Urestone) where applicable

1. **PFI-1A** - STL BRICK - WEATHERED ORANGE (Urestone)
2. **PFI-1B** - USED BRICK - WHITE (Urestone)
3. **PFI-1C**- CLEAN BRICK - HISTORIC RED (Urestone)
4. **PFI-1D** - CLEAN BRICK – TAN (Urestone)
5. **PFI-1E** – SIDING - WHITE
6. **PFI-1F** - STONE – TUSCANY – SLATE GREY(Urestone)
7. **PFI-1G** - CONCRETE FINISH
8. **PFI-1H** - BRICK - WHITE
9. **PFI-1J** - STUCCO FINISH

CORNICE TYPES:

- See drawings for dimensions and details
-

10. **PFI-C1A** - BRICK CORNICE - STL BRICK - WEATHERED ORANGE
11. **PFI-C1B** - BRICK CORNICE - USED BRICK - WHITE (Urestone)
12. **PFI-C1C**- BRICK CORNICE - CLEAN BRICK - HISTORIC RED (Urestone)
13. **PFI-C1D** - BRICK CORNICE - CLEAN BRICK – TAN (Urestone)
14. **PFI-C1H** - BRICK CORNICE – WHITE

BRICK TRIM PIECES:

- **See drawings for details and dimensions**

15. **PFI-02A** - BRICK SOLDIER COURSE TRIM - STL BRICK - WEATHERED ORANGE
16. **PFI-02B** - BRICK SOLDIER COURSE TRIM - USED BRICK - WHITE
17. **PFI-02C** - BRICK SOLDIER COURSE TRIM - CLEAN BRICK - HISTORIC RED
18. **PFI-02D** - BRICK SOLDIER COURSE TRIM - CLEAN BRICK – TAN
19. **PFI-02H** - BRICK SOLDIER COURSE TRIM – WHITE

MISC DECORATIVE PANELS:

See drawings for details and dimensions

20. **PFI-03A** - DECORATIVE PANEL 1: PT-33
21. **PFI-03B** - DECORATIVE PANEL 2: PT-40
22. **PFI-03C** - DECORATIVE PANEL 3: FRAME - PT-40/ PANEL- PT-33
23. **PFI-04A** - FAUX WOOD SHUTTER 17 X 48, PT-34
24. **PFI-04B** – FAUX WOOD SHUTTER 17 X 48, PT-38
25. **PFI-05** – FAUX WOOD SHUTTER 17 X 56,

SMOOTH SOLID COLOR TRIM PANELS:

- Minimum 1.5” thick panels with 1” x1” thick trim piece around the edges

26. PFI-06 – TRIM PANEL – PT-38
27. PFI-07 - TRIM PANEL – FRAME PT-38, PANEL PT-33
28. PFI-08 - TRIM PANEL – PT-42

C. Manufacturers: Subject to compliance with requirements, provide polyurethane products of one (1) of the following:

1. Urestone by Replications Unlimited - (Basis of Design)

2. Texture Plus

3. Ekena Millwork Urethane products

D. Products of other manufacturers will be considered only if evidence is furnished showing compliance with the minimum design and performance requirements specified.

PART 4 - EXECUTION

4.1 GENERAL

A. Manufacturer's Instructions: Prepare substrates, apply primers, and install the Work of this Section; including components, accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified, and where project conditions, require extra precautions or provisions to ensure satisfactory performance of the Work.

4.2 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

4.3 PREPARATION

A. Substrate Acceptability: Commencement of installation shall constitute acceptance of substrate conditions by the Installer.

4.4 INSTALLATION

A. Install plastic fabrication products in accordance with Manufacturer's instructions and approved shop drawings.

B. Apply continuous run of sealant and expandable cellular foam gasket as recommended per Manufacturer's instructions and approved shop drawings to the bolting flanges of all sections for weather-tight installation.

C. Steeple to be assembled on level surface and raised into place.

D. Plastic Fabrication Items shall receive final sealant application on the exterior joints after installation, as approved by Manufacturer.

4.5 ADJUSTING

A. Upon completion of the Work repair surfaces that have been permanently stained, marred, or otherwise damaged. Replace Work which is damaged or cannot be adequately cleaned as directed.

4.6 CLEANING

A. Upon completion of the Work, remove unused materials, debris, containers and equipment from the project site. In addition to the initial cleaning procedure required, and not more than two (2) days before occupancy, clean the Work as recommended by the manufacturer.

4.7 PROTECTION

A. Protect the Work during the construction period so that it will be without any indication of use or damage at the time of acceptance.

END OF SECTION

SECTION 080350

EXTERIOR ENCLOSURE, GENERAL

PART 1 - GENERAL

1.1 SUMMARY

A. Stipulations:

1. The specifications sections “General Conditions to the Construction Contract”, “Special Conditions” and “Division 01 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. General: Provide exterior enclosure in accordance with requirements of the Contract Documents.

C. Section Includes, but not limited to, the following:

1. **WT-01**: Exterior Enclosure, CMU on CMU.
2. **WT-01A**: Exterior Enclosure, CMU on Cold-Formed Metal Framing.
3. **WT-02**: Exterior Enclosure, Metal Panel on CMU.
4. **WT-02A**: Exterior Enclosure, Metal Panel on Cold-Formed Metal Framing.
5. **WT-02B**: Exterior Enclosure, Metal Panel on Structural Mullions.
6. **WT-02C**: Exterior Enclosure, Metal Panel on Concrete.
7. **WT-03**: Exterior Enclosure, Insulated Metal Panel.
8. **CW-01** and **CW-02**: Curtain Wall Assemblies.
9. Entry Canopies

D. Related Requirements:

1. Section 042000 Unit Masonry for masonry work within exterior enclosure.
2. Section 055000 Metal Fabrications for miscellaneous framing not specifically shown on structural drawings.
3. Section 072100 Thermal Insulation for insulation within exterior enclosures.
4. Section 074213 Metal Wall Panels.
5. Section 076200 Sheet Metal Flashing and Trim for flashing within curtain walls.
6. Section 078400 Firestopping for firestopping within curtain walls
7. Section 079200 Joints Sealants for sealing and gasketing within assemblies and

between assemblies and contiguous construction.

8. Section 084100 Entrances and Storefronts.

9. Section 084400 Curtain Wall and Glazed Assemblies for aluminum curtain wall components.

10. Section 088000 Glazing for glass and glazing for exterior enclosures.

E. The Contractor awarded the Exterior Enclosure Work shall be responsible for the engineering, detailing, fabrication and erection of the complete Exterior Enclosure Systems. The Work shall include all labor, materials, tools, equipment, protection, testing and engineering services required to manufacture, deliver, furnish and install all items necessary for the proper execution and completion of the Work, as shown on the Drawings and as specified herein and/or as otherwise required to provide a complete, code-complying and warranted installation.

1.2 REFERENCES

A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict between referenced standards, this specification or within themselves, the more stringent standard or requirement shall govern.

1. American Architectural Manufacturers Association (AAMA): AAMA "Curtain Wall and Design Guide Manual."

2. Aluminium Association (AA)

   a. Aluminum Standards and Data

   b. Designation System for Aluminum Finishes

   c. Engineering Data for Aluminum Structures

3. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM "Metal Finishes Manual."

4. American Society for Testing and Materials (ASTM): ASTM C1401 "Standard Guide for Structural Sealant Glazing."

5. American Welding Society AWS

   a. AWS D1.1 "Structural Welding Code - Steel."

   b. AWS D1.2 "Structural Welding Code - Aluminum."

   c. AWS D1.3 "Structural Welding Code - Sheet Steel."

   d. AWS D1.6 "Structural Welding Code – Stainless Steel."

6. Air Movement and Control Association, Inc. (AMCA): AMCA Standard 500-L "Laboratory Methods of Testing Louvers for Rating."

7. National Fenestration Ratings Council (NFRC)

   a. NFRC 100 "Procedure for Determining Fenestration Product U-Factors

   b. NFRC 200 "Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence."

1.3 SUBMITTALS

A. List of Exterior Enclosure Suppliers: Before submission of shop drawings or samples, submit, for Professional's and Department's information, a complete listing of products, manufacturers and fabricators for the principal exterior enclosure components. Professional's review of listed firms will be tentative, subject to review of subsequent submittals. Also, complete the submittal of manufacturer's data and samples required by other Sections of these specifications, prior to submittal of shop drawings.

B. Product Data: Submit for Professional's action Submit manufacturer's literature and specifications identifying locations and describing the general properties of each material and accessory to be used in the Work including primary function, quality, performance, location and details of construction relative to materials, dimensions of individual components, profiles, and finishes. Include a statement that each product to be furnished is recommended for the application shown. In addition, include complete instructions for handling, storing, mixing, priming, installing, curing and protecting each glazing material.

C. Shop Drawings: Submit, for Professional's action. Submit shop drawings for the fabrication and installation of the Exterior Enclosure Work. Prepare details at not less than 3 in. = 1 ft. minimum scale. Shop drawings shall be prepared by and contain the seal of a qualified licensed Professional Engineer registered in the Commonwealth of Pennsylvania. Include the following:

   1. Show typical and atypical details at large scale of conditions for every member, joint, anchorage and glazing system. Show details of support system, method of attachment to building structure, anchorage details and interface with adjacent work. Show component locations and intersection details. Provide information as to bolt torquing requirements. Show method of isolating dissimilar materials.

   2. Show provisions for expansion and contraction.

   3. Show method of accommodating wind induced and live load interstory differential vertical and horizontal movement.

   4. Show method of accommodating anticipated column shortening (due to loading).

   5. Show provisions for seismic drift, typically and at corners.

   6. Show method of drainage of the system including gutters, weeps and flashings including method of drainage of condensation which might form external to the vapor barrier.

   7. Show reglazing sequence both in the factory and remedial for the field.

   8. Show percentage of free air of louvers.

   9. Combined Submittals: Assemble shop drawings of the principal component parts,

which may be specified in other Sections, into this submittal and prepare coordination details and erection diagrams for the entire exterior enclosure system. In addition, coordinate other work which is contiguous to the exterior enclosure system but not part of the system into this shop drawing submittal. Submit Shop Drawings for other items as denoted in related exterior enclosure specification Sections referenced in herein.

10. Show in this submittal that the exterior enclosure system has received the prior approval of the Contractor, the single firm awarded the exterior enclosure work, and the manufacturer or fabricator of each principal component, including metal, glass, plastic, sealant and gasketing components.

11. Indicate where and how the system deviates from the Contract Documents. Show section moduli of wind load bearing members and calculations of stresses and deflections. Provide material properties and other information needed for structural analysis.

D. Layout Drawings for Anchorage: Submit, for Professional's information, location drawings for fastenings and anchorages to be embedded in concrete showing type of fixing, location, setting-out dimensions and acceptable setting tolerances. Complete floor plans, elevations (if required) and full size details of the embedded anchorage shall be submitted for review along with a fully coordinated set of structural calculations. Details of each type of embedded anchor and/or fixing shall be included within this submittal. Details shall be drawn full size and completely noted. Areas of the building for which exterior cladding shall be attached by means of embedded anchorage shall be identified and included. Areas of the building for which exterior cladding shall be attached without the use of embedded anchorage shall also be identified.

E. Calculations: Submit, for Professional's information. Provide calculations as required and as specified herein for those elements of the exterior enclosure which are not represented by the testing mock-up. Calculations shall contain the seal of a licensed Professional Engineer registered in the Commonwealth of Pennsylvania. Submit calculations as follows:

1. Structural Calculations: Submit structural calculations for frames, connections and panels. Submit engineering calculations to show that maximum deflections do not exceed specified performance requirements under full design loading. These calculations shall include but not be limited to analysis of the following:

a. Vertical Mullions And Framing Members: When a split vertical is involved, both members shall be analyzed (applied load to be apportioned to each part according to its relative stiffness).

b. Horizontal Structural Elements And Framing Members: When a split horizontal is involved, both members shall be analyzed (applied load to be apportioned to each part according to its relative stiffness).

c. Connections between framing members including full analysis of the screw race. Provide bolt torquing calculations.

d. Lateral buckling of members.

e. Local bending of member components.

f. Strength of embedded anchor assembly as well as pull out and/or

reaction forces shared with the building structure.

g. Curtain wall anchor clips, inserts and fasteners and/or assemblies including bolts and stiffeners. Analysis shall include loadings diagrams of superimposed Exterior Enclosure Loads to be transferred to and accommodated by the building structure for each type of anchor, fastener and connection demonstrating that they will sustain imposed design loads.

h. Glass with regards to stress, required thickness and deflection. Glass shall also be analyzed for thermal stress and shading patterns.

i. Aluminum panels with regards to deflection.

j. Structural silicone with regards to stress and depth of joint.

k. Data for glass showing that the probability of breakage at the design wind pressure will not exceed the specified probability of breakage for each type, size and thickness of glass. Submit glass manufacturer's substantiating data.

l. Calculations of expansion and contraction.

m. Calculations of expansion and contraction for interstory drift and column shorting (due to gravity loads).

n. Structural calculations for the anchorages of the Department's exterior washer restraint systems.

o. Calculations for anchors, inserts and fasteners demonstrating that they will sustain imposed design loads.

G. Quality Control Submittals: Submit for Professional’s information

1. Test Reports

a. Preconstruction Sealant Compatibility and Adhesion Testing: Test results confirming compatibility, non-staining, non-migration, and adhesion for specific materials in contact with exterior glazing, metals, masonry, precast and sealants prior to mock-up and testing.

1) Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.

2) Investigate materials that fail compatibility and adhesion testing and obtain sealant manufacturers written recommendations for corrective measures, including use of primers.

2. Corrosion Analysis Report

a. Provide a corrosion analysis report containing a component by component analysis of potential corrosion resulting from galvanic action between materials, for metal components of the exterior enclosure and provide engineering report to Professional for review prior to submission of shop drawings. Report shall be conducted by a licensed Professional

Engineer who is an expert in corrosion.

b. Provide within report, a letter of confirmation from the Professional Engineer that states that all components, accompanying trims and flashings and attachments to adjacent construction have been designed to eliminate the potential for galvanic action between components.

3. Certificates

a. Document Review: Before commencing work, submit a written statement signed by the Contractor and the Manufacturer/Fabricator certifying that the Contract Documents, shop drawings and product data have been reviewed with material manufacturers' qualified technical representatives and that they agree the selected materials are proper, compatible with contiguous materials and adequate for the application shown.

b. Certifications of Application: Copy of certification in an approved form, stating that the completed exterior enclosure complies with these Specifications, that the component parts were properly designed or selected for the application made, and that installation methods complied with manufacturer's printed instructions and their field representatives' verbal instructions, and were proper and adequate for the condition of installation and use in each case, signed by the Contractor and the single firm awarded the exterior enclosure work.

c. Certification of Louvers: Copy of certification in an approved form stating that the louvers when installed and subjected to normal operating conditions will not create objectionable noises and are in compliance with applicable codes, AMCA "Standard 500-L " and AMCA "Standard 550" (where applicable).

H. Closeout Submittals: Submit, for Department’s documentation,

1. Warranties: Special warranties specified.

2. Maintenance Manual: Two (2) copies of an assembled and bound maintenance manual as well as a digital copy on CD, describing the materials, devices and procedures to be followed in cleaning and maintaining the exterior enclosure. Include manufacturer's brochures describing the actual materials used in the Work, including metal alloys, finishes, glass, sealants, gaskets and other major components.

1.4 QUALITY CONTROL

A. Fabricator/Installer Source Limitations: So that there will be undivided responsibility **per building**, award the exterior building enclosure work to a single firm specializing in each principal type of work **per building**, with a minimum of 5 years continuous operations and experience which has successfully completed, comparable sized projects. General Contractor remains responsible for providing fully coordinated exterior building enclosure Work **for all buildings**, per Contract Documents. This Work includes but is not limited, to designing, engineering, **providing required mock-ups and testing,** fabricating, transporting**,** and erecting the exterior building enclosure system so that **consistent** performance and aesthetic requirements are complied with **for all buildings**.

B. Engineering Responsibility: Engage the services of a qualified Professional Engineer who

is licensed to practice in the state where the project occurs and who is experienced in providing engineering services of the kind indicated to prepare or supervise the preparation of data for the exterior enclosure systems, including drawings, testing program development, test-result interpretation, and comprehensive engineering analysis that show the systems' compliance with the specified requirements. Engineering services are defined as those performed for installations of systems that are similar to those indicated for this Project in material, design, and extent.

C. Corrosion Analysis: Engage a licensed Professional Engineer who is an expert in corrosion, to conduct a component by component analysis of potential corrosion resulting from galvanic action between materials, for metal components of exterior enclosure and provide engineering report to Professional for review prior to submission of shop drawings. Ensure sample and test results are available upon request.

D. Product Options: Information on Drawings and in Specifications establishes requirements for exterior enclosure system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sight lines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including established engineering methodology (i.e., calculations) preconstruction testing, field testing, and/or in-service performance.

E. Intended Aesthetic Effects: Do not modify intended aesthetic effects, as judged solely by Design Professional, except with Professional's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Professional for review.

F. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from authorities having jurisdiction.

G. Test and Visual Mock-Up(s)

1. Visual Mock-Up(s)

a. Provide, at (fabricator's plant), (Project site where directed), visual mock-up(s) of the exterior enclosure for visual review by the Professional, extent as shown, and representative of the finished Work. Provide joint conditions, anchorage, specified glass, panels, paint finish and other materials and features as will be used in the final Work.

b. Visual mock-up(s) shall be erected to sizes as noted, containing materials required for proposed finished exterior enclosure. Specimen shall be constructed with top sides and back at least 10 ft. deep with access to interior space, so as to allow viewing from interior of mock up assembly. Provide simulated lighting (type and color) with flat ceiling replicating finished construction.

c. Clean mock-up(s) with materials and techniques intended for use on the Project.

d. Replace unsatisfactory Work as required to obtain approval of the Professional. The approved visual mock-up(s) will become the standard of workmanship for the project. The approval of the visual mock-up(s)

does not relieve the Contractor of its obligation to perform the work in accordance with the Contract Documents.

2. Testing Mock-Up(s): Provide materials and related accessories so as to construct testing mock-up(s) in composite configurations shown, designed to fulfill specified performance criteria, and representing the elements which will be used in the final work. Extent of mock-up(s) are shown on the Drawings. Provide personnel to install wall mock-up(s) who will be the same personnel who will be performing the actual Work. Simulate actual construction conditions as accurately as possible in every way.

H. Pre-Installation Meeting: Prior to the start of the Work, meet at the Project site to review material selections, availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays, methods and sequence of exterior enclosure installation, structural load limitations, special details and conditions, standard of workmanship, quality control requirements, testing, inspecting, and certifying procedures, job organization, coordination with other trades, and other pertinent topics related to the Work.

1.5 **WARRANTY**

A. The Warranty submitted under this Section shall not deprive the Department of other rights or remedies that the Department may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1. Special Warranty, Exterior enclosure: Submit for Department's documentation. Provide a written warranty, for a ten (10) year period from defects of materials or workmanship. Repair or replace exterior enclosure work and correct leaks and/or other defects in material or workmanship during the warranty period. Warranty shall be signed by the Contractor and the single firm awarded the exterior enclosure work. Upon notification of defects, within the warranty period, make the necessary repairs or replacements, including cost of materials and labor, at the convenience of the Department.

a. Defects: Defects are defined to include, but not limited to the following:

1) Failure of the system to meet performance requirements including but not limited to excessive deflection, racking, warpage, water leakage or air infiltration.

2) Cracking, pitting or discoloration of glass reflective coatings or decorative coatings.

3) Loss of effective glass bite due to shifting of glass or loss of effective glass bearing of setting blocks due to shifting of glass and/or blocks.

4) Failure of operational parts to function normally.

5) Deterioration, fading, excessive non-uniformity, pitting, cracking, peeling, crazing or discoloration of finishes and other materials beyond normal weathering.

6) Adhesive or cohesive sealant failures or crazing on surface of

sealant.

7) Disengagement of gaskets or weatherstrips.

8) Collapse of thermal insulation or safing insulation.

2. Special Warranties: Certain materials associated with the exterior enclosure are required to have special warranties, which shall not limit or reduce the requirements of the exterior enclosure system warranty. Special warranties may originate, in part or in whole, with manufacturers or fabricators and pass through the Contractor to the Department. However, warranties as written or interpreted by manufacturers or fabricators shall not limit or reduce the special warranty requirements of this specification. Submit warranties for other items as denoted in related exterior enclosure specification sections.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Materials shall be new and free from defects that may impair the strength, functioning, durability or appearance of the Exterior enclosure System or adjacent construction. Testing by an independent testing laboratory or review of data by the Professional shall not mitigate the Contractor's responsibility for performance of the Exterior enclosure System nor relieve the Contractor of its responsibility to verify for themselves that the work conforms to the Contract Documents.

2.2 GENERAL WALL TYPES

A. **WT-01**: Exterior Enclosure, Decorative CMU on CMU backup.

B. **WT-01A**: Exterior Enclosure, Decorative CMU on Cold-Formed Metal Framing.

C. **WT-02**: Exterior Enclosure, Metal Panel on CMU backup.

D. **WT-02A**: Exterior Enclosure, Metal Panel on Cold-Formed Metal Framing.

E. **WT-02B**: Exterior Enclosure, Metal Panel on Structural Mullions.

F. **WT-02C**: Exterior Enclosure, Metal Panel on Concrete.

G. **WT-03**: Exterior Enclosure, Insulated Metal Panel.

H. **CW-1A** Unitized Curtain Wall W/10" Applied Exterior Fin and Vision Glazing at Convex Face of Building

I. **CW-1AS**: Unitized Curtain Wall W/10" Applied Ext Fin and Full Shadow Box at Convex Face of Building

J. **CW-1B**: Unitized Curtain Wall W/5" Applied Ext Fin and Vision Glazing at Convex Face of Building

K. **CW-1C:** Unitized Curtain Wall W/10" Applied Ext Fin and Vision Glazing at Concave Face of Building

L. **CW-1CS:** Unitized Curtain Wall W/10" Applied Ext Fin and Full Shadow Box at Concave Face of Building

M. **CW-1D**: Unitized Curtain Wall W/10" Applied Ext Fin and Vision Glazing at Straight Face of Building

N. **CW-1DS**: Unitized Curtain Wall W/10" Applied Ext Fin and Full Shadow Box at Straight Face of Building

O. **CW-2**: Unitized Curtain Wall Vision Glazing at Straight Face of Building

G. Exterior Enclosure system shall include all miscellaneous framing, sub-framing, attachment clips and fasteners, sheet metal accessories, sealants and joint filler; including bent steel plate and steel angle framing, anchors, and attachments for the system to structure, as shown on drawings and as required for complete installation.

2.3 DESIGN AND PERFORMANCE REQUIREMENTS

A. Design Requirements: The exterior enclosure system as described herein is that portion of the facade that comprises materials, components and assemblies between the internal and the external surfaces, installed in conjunction other specified facade elements, will produce a complete building "façade" which shall be considered a complete system providing a high quality, watertight, airtight and structurally sound enclosure to the specified standards. Drawings and details are diagrammatic and are intended to show design concept, configuration, components and arrangements; they are not intended to identify nor solve completely problems of thermal and structural movements, air pressure equalization, air and vapor barriers, assembly framing, fixings and anchorages, moisture disposal, water penetration and problems at the glass line associated with glazing installation, movements, pressure fracture or thermal shock and weather seal. Final engineering design of exterior enclosure is responsibility of this trade. Material types, sizes and/or thicknesses shown on Drawings are minimums acceptable and shall not be reduced regardless of engineering design. System to include galvanized steel reinforcing and support as required to meet design loads and minimize overall mullion sightlines. The work of this Section includes, but is not limited to, the following

1. Aluminum metal exterior enclosure components including finish coatings.

2. Aluminum trim as may be necessary to join adjoining materials to the metal and glass assemblies including finish coatings.

3. Aluminum or Stainless steel as indicated: copings, counter flashings, fascias and integrated metal panels necessary to produce water tight parapets including finish coatings complete with anchors and brackets.

4. Aluminum or Stainless steel as indicated: fascias, soffits, architectural features, access panels, access doors, access windows, etc. and hardware miscellaneous trim and accessories including finish coatings.

5. Glass, glazing and accessories associated with the metal and glass exterior building enclosure.

6. Metal panels, infill panels, spandrels, shadow boxes and trim in designated portions of the facade including finish coatings.

7. Masonry work complete with associated structural backup and supports.

8. Finished interior sill and head trim including metal closure from the interior of curtain wall to the top of slab as backing to interior floor finishes.

9. Insulation and vapor barrier within the exterior portion of the facade.

10. Out-of-sequence infill areas and overlaps with other trades as defined and coordinated by Contractor.

11. Fire separation insulation and firestopping, including smoke seals, at the junction of slab edges and elsewhere within the aluminum and glass portion of the facade and including the necessary galvanized sealed smoke stops and other accessories associated with the system.

12. All reinforcing (stiffeners, brackets, etc.) required to strengthen or reinforce the metal and glass exterior enclosure systems and/or steel members that is not specifically called out as structural steel or miscellaneous iron.

13. Sealants, joint fillers, gaskets, necessary to produce a watertight installation including sealants and joint fillers at the junction of the aluminum and glass elements, masonry work and contiguous facade components.

14. Weeps, baffles, thermal breaks, flashings, necessary to meet performance requirements.

15. Anchors, inserts, embedded devices, necessary to support the exterior enclosure system. This shall include but not be limited to design, engineering, coordination, manufacture, supply, layout, monitoring and field checking, installation and necessary repair of the exterior enclosure fixing anchors and their attachment to the embedded anchorage and the anchorage embeds.

16. Aluminum louvers (and associated insulated blank-off panels and splash pans) occurring within the field of exterior enclosure construction including finish. Provide flanges around active louver areas drained to exterior to accept ductwork and plenum closures.

17. Coordination with other trade contractors that have components of their work installed on or within the exterior enclosure system.

18. Shop drawings, structural calculations, manufacturer’s data, certifications of compliance and selected samples of materials and warranties pertaining to the exterior building enclosure.

19. Construction of full size visual mock-ups and mock-ups for performance testing.

20. Testing of mock-up(s) at independent testing laboratory approved by the Department including coordination of testing and testing procedures with the selected laboratory and payment of laboratory fees.

21. Quality assurance/control testing and inspection work not otherwise specifically assigned to others.

22. Field measurements of adjacent and/or supporting construction and verification of existing conditions.

23. Field testing of assemblies for water and air infiltration.

24. Protection including protective film and removal of same film and cleaning of finished work (both interior and exterior surface of exterior enclosure systems).*Identify max duration of film on glass.

25. Participation in coordination meetings throughout the course of the Work.

26. Preparation of "as-built" shop drawings reflecting changes (from original "approved" shop drawings) that may have occurred during construction and testing of the performance mockup or the course of the work.

B. Performance Requirements

1. Structural

a. Wind Loading Requirements: Design, fabricate and install component parts so that the completed exterior enclosure will withstand the inward and outward pressures normal to the plane of the wall per ASCE 7-16. Refer to structure drawings for wind coefficients. At corners and other changes in plane, both surfaces shall be assumed to experience the most severe combinations of negative and positive pressures simultaneously.

1) Incorporate within exterior enclosure design loadings induced by the following:

a) Architectural metal entrances.

b) Overhanging elements.

c) Building maintenance systems.

d) Ice accumulation on projecting elements.

b. Building Movement: Design, fabricate and install exterior enclosure to withstand building movements including loading deflections, shrinkage, creep, seismic and similar movements. Design for simultaneous occurrence of all specified movements. No reductions shall be applied to individual movements or to combinations of movements. Building movement shall be accommodated by interlocking aluminum components not through slippage of glass relative to framing members. Glass, metal or masonry panel infills, sealants and interior finishes shall not be assumed to contribute to framing member strength, stiffness or lateral stability unless written approval is obtained from the sealant manufacturers and the glass or other infill manufacturers/fabricators and is approved by the Professional.

c. Live Load Deflection: Design, fabricate and install the exterior enclosure to accommodate live load deflection of spandrel beams and floor assemblies. Anticipated mid-span live load deflections of spandrel beams in this installation shall not exceed 3/8” in for the Marquee building, and ¾” for the Pre-engineered Metal Buildings.

d. Interstory Drift (Racking): Design, fabricate and install exterior enclosure to withstand building movements (displacements) of H/400 for the Marquee building and H/200 for the Pre-engineered Metal Buildings due to wind drift (racking). At given floor the maximum in-plane wind drift displacement shall be assumed to occur while the floors immediately above and below remain in an undisplaced condition for wind drift displacements up to and including the maximum values. There shall be no failure or gross permanent distortion of anchors, frames, glass or panels; sealants shall not experience adhesive or cohesive failure, gaskets shall not fail and glazing gaskets shall not disengage.

e. Column Shortening(Due to Loading): Design, fabricate and install the exterior enclosure to accommodate column shortening (due to loading). Anticipated column shortening in this installation will not exceed 1/16 in. per floor.

2. Maximum Deflections Normal to the Wall: Maximum full load deflections, normal to the wall plane, shall not exceed 75% of the design clearance dimension between that member and the panel, glass, masonry or other part immediately adjacent. Submit engineering calculations to show maximum deflections based on full panel loads, uniformly distributed, building deflections, thermal stresses, and erection tolerances. Glass, sealants and interior finishes shall not be included to contribute to framing member strength, stiffness or lateral stability. Limit vertical deflection of glazing framing system so as to prevent ponding of water within the glazing rabbet. Deflection of members under 1.5 times design wind load shall not result in sealant failure. Splice joints which permit thermal and other movements by slippage within the joint shall be assumed to have zero moment capacity. Maximum full load deflections, normal to the wall plane, for wall member or component shall not exceed the following:

   a. Exterior Aluminum and Glass Wall Systems (Including Storefronts and Entrances):

      1) L/175 of its clear span of the component part or 3/4 in. , whichever is less for spans up to 15 ft. , except limit the maximum center deflection of glass to 1 in. and deflection of the entire assembly including glass to 1-1/2 in. .

      2) L/240 of its clear span of the component part or 1-1/2 in. , whichever is less for spans in excess of 15 ft. and up to 40 ft. ,except limit the maximum center deflection of glass to 1 in. and deflection of the entire assembly including glass to 2 in. .

      3) Deflection of cantilevered elements at full design wind pressure (e.g., parapets or framing members overhanging anchor points), shall not exceed 1% of the cantilever length or 3/4 in. whichever is less.

      4) Deflection shall not exceed L/300 for glass supporting members spanning door or other passage openings or L/360 of the span when a plastered surface is affected. Deflection of framing members overhanging an anchor point is limited to 2 times the length of the cantilevered member, divided by 175.

      5) Deflections Parallel to Wall: Limited to L/360 of clear span or 1/8

in. , whichever is smaller or amount not exceeding that which reduces glazing bite to less than 75% of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 in..

6) Ensure in the case of a "split mullion", offset between the 2 halves does not exceed 1/32 in. under full design load and slippage/displacement of anchorage under load does not exceed 1/16 in. overall.

7) Exterior Metal Panels, Fascias, Metal Covers or Other Fabricated Metal Items: L/120 of its clear span or 3/4 in whichever is less. Deflection shall be measured relative to the horizontal and vertical support members with the allowable deflection being determined by the lesser dimension.

8) Back Pans: Back pan shall be designed for L/60 or 1 in. maximum deflection criteria and shall not bow or warp along the perimeter edge in a manner which will tear sealants or disengage from fasteners when subjected to 1.5 times the design loads. The back pan shall not make noise when loads are applied and/or released. The back pan contained within each unitized panel shall be one piece. Multiple piece constructions (pieces attached together) are not acceptable.

   a) Back pans shall be designed to accept full structural design loads if the exterior enclosure system employs a compartmentalized pressure equalized or a back ventilated design principle

9) Exterior Masonry Walls: Design exterior enclosure support systems holding masonry work to limit deflection within the system and within the masonry units to values which allow the masonry units to sustain imposed loads, for each combination of masonry/anchor/support framing configurations and variations, intended for use on the project, within the specified design limits and factors of safety; but not greater than L/600 of its clear span or 1/8 in. ; whichever is less. In addition to the above deflections, masonry supporting aluminum framing members shall be limited to L/600 parallel and perpendicular to the wall plane, with rotation of continuous member on kerfed masonry limited to 1/16 in. maximum.

10) Windows within Exterior Masonry Walls: L/175 of its clear span between anchorages or 3/4 in. , whichever is less.

11) Exterior enclosure Louvers: L/180 of its clear span.

b. Deformation: Permanent deformation, weld or fastener failure, component disengagement or breakage shall not occur under loading equal to 1.5 times the design load pressures (positive and negative) specified herein. Permanent deformation is defined as deflection without recovery exceeding component length/1000.

c. Anchorage:

1) Anchorage disengagement or breakage shall not occur when an installed unit is subjected to a force equal to 2.5 times the design load.

2) Anchorage shall be properly braced in three orthogonal directions (vertical, transverse, and longitudinal) to resist specified loadings on Drawings from any direction (both positive and negative pressure). *highlight to include where this is specified

3) Anchors and supports shall be designed and located so as to allow a uniform distribution of anticipated wind loads, and shall not impart any unauthorized torsional loading to spandrel beams, cause excessive stress on the structure, cause excessive deflection, inhibit thermal movement or conflict with clearances for equipment. Eccentric loads imposed into the building structural elements by the exterior enclosure anchorage are not allowed. Eccentric loads created by the anchorage of the exterior enclosure shall be neutralized by the addition of bracing, stiffeners, or other means required.

d. Seismic Drift: Design to withstand minimum lateral movements per floor shown and as follows:

1) Earthquake Design for Serviceabilty: H/500 story drift for the Marquee building and H/100 story drift for the Pre-engineered Metal Buildings. Units shall have no structural failure or deterioration, no sealant failure, no permanent deformation of metal components. Units shall not make contact with adjacent panels or with the structural frame. Connections shall permit relative movement between the unit supporting frame and shall have at least 3 times the deformation capacity (as defined below) as required by Earthquake Serviceability displacements and shall remain essentially elastic under the action of these deformations.

2) Earthquake Level 2 Design for Ultimate: H/200 story drift for the Marquee building and H/40 story drift for the Pre-engineered Metal Buildings. Units and connections shall have no structural failure. Units and connections shall be that no falling hazards are possible. Cladding units shall have no breakage. Sealant and gaskets failure shall be minimized. Permanent deformations of metal components shall be minimized. Cladding units shall not make contact with adjacent panels or with the structural frame. Connections shall permit relative movement between the unit supporting frame and shall have at least 1.5 times the deformation capacity (as defined below) as required by Earthquake 2 displacements.

3) Floor to Floor Height Variation: Modify seismic drift requirements in direct proportion to floor to floor height where that height differs from 12’.

4) Connections: Design connections for 4/3 times specified forces.

Design bolts, inserts, welds, dowels and similar fasteners to withstand 4 times specified forces.

5) Lateral Acceleration: Accommodate minimum seismic design forces of not less than 0.3 times weight of supported element.

6) Seismic Requirements: Per Commonwealth of Pennsylvania Building Code, 2015.

7) Deformation Capacity of Flexible Connections: The deformation capacity of a flexible connection shall be determined as the value of deformation that results in fracture or cracking or otherwise causes a loss of strength on the connector or panel, or is the value of deformation that causes sliding parts to come into contact.

8) Corner Units: Under either Earthquake Level, corner units at building corners shall be joined in a way as to permit the out-of-plane deformations on one face occur without impact panels or panel connections on adjacent perpendicular faces.

9) Additional Framing: Provide miscellaneous steel framing not shown on drawings which is required to satisfy seismic criteria.

3. Critical Dimensions: The following critical dimensions shall be utilized without modification.

a. Wall Assembly Depth: Provide a complete wall system as shown and specified with components and systems located within the area from the exterior face as shown to the face of column, beam or edge of slab shown, without encroachment or displacement of the interior construction and finishes shown.

b. Structural Tolerances: The exterior enclosure system design shall accommodate variation in location of surrounding and supporting work. Assume steel erection tolerances no less than permitted by the American Institute of Steel Construction (AISC). Assume concrete erection tolerances no less than permitted by ACI 117 "Standard Tolerances for Concrete Construction and Materials." or +/-1" in each of the X,Y,Z directions, whichever is worse.

4. Temperature Requirements: Design, fabricate and install component parts to provide for vertical and horizontal expansion and contraction of the exterior enclosure over an ambient exterior temperature range and exterior metal surface temperature of –10 deg. F. through +180 deg. F. ; an interior temperature range of +55 deg. F. to 120 deg. F. without buckling, sealed joint failure, glass breakage, undue stress on members or anchors, and other detrimental effects.

a. Shadow Boxes: Shadow boxes shall be designed for an exposed surface metal temperature (including paint coating system) range of -18 deg F. to +235 deg F. Design glass seals, gaskets, sealant, etc. to perform under these high temperatures. Provide for venting of shadow box back pan. The metal back panel shall exhibit no distress (buckling or distortion) nor shall fastener failure occur as a result of temperature exposure.

5. Flatwork Tolerances: Metals panels, fascias, sills and other sheet or plate fabricated items shall be flat and free of bow or "oil canning" or "read thru" of stiffeners, welds under all lighting conditions. Exposed metal faces shall be of such flatness that the maximum uniform bow in 2 ft. shall not exceed 1/32 in. and the maximum overall variation in plane between high and low point within a panel shall not exceed 1/16 in.. Metal panels shall be a min. of 1/8" U.O.N. Aluminum Composite Metal panels are prohibited and will not be considered.

6. Structural Sealant Glazed Curtain Wall System: Comply with ASTM C1401 "Standard Guide for Structural Sealant Glazing" and AAMA CW 13 "Structural Sealant Glazing Systems." Provide structural silicone sealant glazed exterior enclosure system that withstands tensile and shear stresses imposed by system without failing adhesively or cohesively and that has the following capabilities based on preconstruction testing:

    a. Withstands loads and thermal and structural movement requirements indicated without failure. (Structural silicone sealant shall not carry gravity load of glazing)Failure includes the following:

        1) Air infiltration and water penetration exceeding specified limits.

        2) Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

    b. Glazing is physically and thermally isolated from framing members and glazing-to-glazing joints accommodate thermal and mechanical movements of glazing and system, prevent glazing-to-glazing contact, prevent thermal shock, prevent pressure fracture damage, and maintain required edge clearances.

    c. Tensile or shear stress in structural silicone sealant joints is less than 20 psi with a safety factor of 5:1.

    d. Provide structural sealant glazed exterior enclosure system members that do not deflect an amount which will reduce glazing bite below 75 % of design dimension when carrying full dead load. Provide a minimum 1/8 in. clearance between members and top of fixed panels, glazing, or other fixed part immediately below. Provide a minimum 1/16 in. clearance between members and operable windows and doors.

    e. Provide structural sealant glazed exterior enclosure system, including anchorage, that accommodates supporting structure's deflection from uniformly distributed and concentrated live loads indicated and that accommodates structural movements including, but not limited to, sway, twist, column shortening, long-term creep, and deflection without failure of materials or permanent deformation.

    f. Provide structural sealant glazed exterior enclosure system, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction and as specified herein.

    g. Provide sealant that fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required. Adhesive failure occurs when sealant pulls away

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

h. Provide only neutral cure structural silicone as manufactured by Dow Corning Corporation or Momentive Performance Materials Inc . Do not utilize high modulus structural silicone as a weatherseal.

7. Pressure Equalized System: Design, fabricate and install component parts employing the pressure equalized rain screen principle; providing a impervious air and vapor barrier within specified limits.

8. Air and Water Control: Design, fabricate and install exterior enclosure systems and components to provide a impervious air and vapor barrier within specified limits. Provide tight joints and effectively seal component parts of exterior enclosure, including their joints with contiguous work, against water leakage and air infiltration. Water leakage is defined as the appearance of uncontrolled water, other than condensation, on inboard part of exterior enclosure, either during field water penetration testing or under actual weather conditions. Uncontrolled water is defined as leakage that is not contained and\or drained away in a manner as to cause damage to the exterior enclosure, adjacent construction, finishes or visible in the final construction.

a. Provide two distinct lines of defense against the intrusion of water into the exterior enclosures.

b. Provide a system of gutters and drainage components separately or in conjunction with contiguous work. Collect and drain water from within the exterior enclosures at every story height. Make provisions to drain water and condensation to exterior face of wall. Provide flashings and gutters for exterior enclosures and for the connection of contiguous work. Give special attention to the connection of drainage members at columns, spandrel beams and other areas of limited access. The use of carbon steel components for gutter and drainage assemblies is prohibited. Provide stainless steel or aluminum components.

c. Air infiltrations shall not exceed the herein specified values when tested at 6.24 psf negative or positive test pressure, (not including operating doors), as follows:

1) Aluminum and Glass Walls (Other Than Louvers and Doors): 0.06 cfm/ft.^{2} of wall area.

2) Fixed Aluminum Windows within Exterior enclosure: 0.06 cfm/ft.^{2} of wall area.

3) Operable Windows: 0.10 cfm/ft. of crack length for operable portions of window.

4) Architectural Metal Entrances: 0.06 cfm/ft.^{2} of wall area, not including operating doors.

5) Exterior Masonry Walls: 0.06 cfm/ft.^{2} of wall area.

6) Exterior Walls: 0.06 cfm/ft.^{2} of wall area.

7) Operating Swing Doors Contained Within Curtain Wall: Air infiltration per linear foot of perimeter crack of not more than 0.50 cfm for single doors and 1.0 cfm for pairs of doors per ASTM E283 at pressure differential of 1.567 psf .

8) Skylights: 0.30 cfm/sf tested at a min. of 1.57 psf.

9) Exterior Masonry Walls: Provide a continuous air space behind masonry facing, except as required at locations of masonry anchors. Provide masonry anchors with cross sectional profiles orientated to promote water drainage, unless used as part of the drainage system. Provide holes, slots or other drainage outlets for masonry anchors wider than 4 in. . The use of carbon steel components for gutter and drainage assemblies is prohibited. Provide stainless steel or aluminum components.

d. Drainage Members: Give special attention to the connection of drainage members to assure the control of water to gutters and weeps, to prevent the entry of uncontrolled water at the locations of connection between exterior masonry walls and contiguous windows.

9. Fire, Smoke and Draft Barrier: Provide a continuous fire/smoke/draft barrier as an integral component of the exterior enclosure systems to prevent the passage of air, flame and smoke from one floor to another, within the exterior enclosure work. Comply with the requirements of the local authorities having jurisdiction, including testing and certification requirements.

a. Design the barrier system to accept floor fire-safing as an integral part of the system.

b. Design the barrier to sustain the impact from a fire hose stream in accordance with the requirements of the local authorities having jurisdiction.

10. Glazing details shall allow for glass replacement after initial construction permitting reuse of the majority of the original glazing materials and replacement glass of same nominal size and makeup as the original glass without requiring cutting of framing member or removal of interior finishes. Vision glass in conventional frames shall be replaceable from interior. Spandrel glass whether monolithic or in a shadow box configuration shall be replaceable from the exterior. Structural silicone supported vision glass shall be replaceable from exterior and/or interior.

a. Ensure glazing gaskets and sealants on inside of glass units are conductive type and installed in a manner to ensure interior building heat is conducted through metal framing, mullions and sills, through gaskets and sealants to glass edge while maintaining air seal. Ensure no voids between glass edges and gaskets and sealants occur. Ensure glazing gaskets and sealants on building exterior side of glass units are non-conductive.

11. Rated Exterior Enclosure Spandrel Assembly: Design, fabricate, and install a one hour rated spandrel assembly to provide a minimum of 3 ft. of vertical separation

between openings in exterior enclosure. Comply with the requirements of the local authorities having jurisdiction.

12. Condensation Requirements: Design, fabricate, and install the exterior enclosure to prevent excessive condensation on the indoor face with the building heating and ventilating system in normal operation. Excessive condensation is defined as visible water, ice or frost on more than 5% of the area of module of the exterior enclosure, visible in the final construction or the accumulation of uncontrolled condensation flowing from the exterior enclosure. A module for unitized curtain wall is defined as the area of one curtain wall unit. A module for other non-unitized wall types is an areas bound by the wall height by a width equal to the height.

    a. Heating Season

        1) External Ambient Min. Temperature: 5 deg. F.

        2) Internal Air Temperature: 72 deg. F. (non-natatoria)

        3) Internal Air Temperature: 80-84 deg F (natatoria)

        4) External Relative Humidity: 20% - 100%

        5) Internal Relative Humidity: 30% (non-natatoria spaces)

        6) Internal Relative Humidity: 50-60% (natatoria)

        7) Surface Temperature: 50 deg. F.

    b. Cooling Season

        1) External Ambient Max. temperature: 93 deg. F.

        2) Internal Air Temperature: Minimum 70 deg. F. (non-natatoria)

        3) Internal Air Temperature: Minimum 80 -84 deg. F. (natatorial)

        4) External Relative Humidity: up to 100%

        5) Internal Relative Humidity: up to 50%

        6) Surface Temperature: 140 deg. F.

    c. The aluminum exterior enclosure system shall be of thermal-break construction that has been tested in accordance with AAMA 1503 and certified by the manufacturer to provide a condensation resistance factor (CRF) of at least 60. Thermal breaks shall be assumed to have no ability to transfer shear stress for composite action of flexural members. Elements joined by a thermal break shall be assumed to act separately.

        1) Provide thermal break by a continuously extruded, multi-directional 25% glass fiber reinforced 6/6 polyamide nylon (Strip). Aluminum framing members separated up to a maximum of 3 in. with a locking mechanical connection to the thermal strip(s) by knurling the aluminum cavity and crimping the strip(s)

into place to create a composite thermal barrier assembly. Structural performance values of the Thermal Barrier assembly to meet specific product/project design criteria or at a minimum certified testing criteria and procedures as described by the AAMA TIR-A8 performance standards.

13. Overall Thermal and Solar Performance: Overall Thermal and Solar Performance characteristics for aluminum and glass exterior enclosure assemblies (including glass, frame, sill starter, head receptor, expansion joints, and stack joints) shall be equal to or better than the following:

    a. Glazed Curtain Wall:

        1) Vision area:

            a) U-Value (Winter Nighttime): 0.34 BTU/(hr x ft^2 x deg F) (maximum).

        2) Spandrel area system winter U-factor:

            a) ≤ 0.15 Btu /h sf °F

        3) Solar Heat Gain Coefficient (SHGC): 0.30

    b. Unitized Curtain Wall with Metal Panel:

        1) System winter U-value: ≤ 0.15 Btu /hr-sf-F

    c. Decorative CMU on CMU backup:

        1) System winter U-value: ≤ 0.15 Btu /hr-sf-F

    d. Decorative CMU on cold formed framing:

        1) System winter U-value: ≤ 0.15 Btu /hr-sf-F

    e. Metal Panel on structural mullions:

        1) System winter U-value: ≤ 0.15 Btu /hr-sf-F

14. Insulation Barrier: Design, fabricate and install exterior enclosure work with an integral continuous insulation barrier and vapor barrier to provide an insulated exterior enclosure system.

    a. The R-value or thickness shown on the drawings is the minimum effective thermal value or thickness for the insulation barrier. Provide additional insulation thickness to compensate for losses in insulation value due to wall supports configuration, gaps and tolerances between wall panels and other wall assembly component requirements.

    b. U-Factors of fenestration products (windows, glazed doors, curtain walls, storefronts and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and labeled and certified by the manufacturer.

c. The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors, curtain walls, storefronts and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory and labeled and certified by the manufacturer.

d. Locate moisture sensitive materials in areas protected from exposure to moisture, including moisture from sources of temporary exposure prior to installation of contiguous work.

e. Provide a complete and uninterrupted vapor barrier separate from or combined with the other wall barrier systems.

15. Snap-On Mullion Covers: In areas utilizing exposed exterior mullion covers of snap-on design, provide a minimum of two (2) concealed fasteners to prevent displacement or accidental removal of trim. Show locations of mechanical fasteners on shop drawings.

16. Lock Strip Gaskets: Design lock strip gaskets to withstand pressures equal to 1.5 times the design loads indicated herein without glass roll-out or glass failure.

17. The Department has selected a building maintenance system that is gound-based and does not require a intermittent stabilization anchors (ISA's).

18. Louvers

a. General: Provide louvers bearing AMCA certified rating seal and meeting the following performance requirements:

1) Free Area: Not less than 50% free air for a 48 in. x 48 in. size unless otherwise shown or specified.

2) Static Pressure Loss: Not more than 0.15 in. of water gage at an airflow of 1050 fpm free area velocity in intake direction.

3) Beginning Point of Water Penetration: Not more than 0.01 oz./ft.^{2} ^{2} of free area at an airflow of 1000 fpm free air velocity when tested for 15 minutes.

b. Entire louver assembly utilized in the final Work shall provide the percentage of free air shown for the respective locations.

c. Design assembly so that objectionable noises are not created when installed assembly are subjected to wind loads within the range from 0.0 psf to the design load specified.

d. Removal and Replacement: Design, fabricate and install louvers so that they are easily removable and replaceable (in the event that equipment or materials need to be moved through).

e. Design, fabricate and install louvers with removable, rewireable bird screens fabricated of same metal and finish as louvers set in a folded extruded frame at all active louvers.

f. Design, fabricate and install louvers with insulated blank-off plates in areas as shown and where ducts do not attach to louver.

g. In areas where shown, provide louvered doors matching aluminum louvers in all details. Comply with requirements as specified elsewhere for hollow metal doors and frames

19. Lighting Fixtures, Security Devices, Signage, and other appurtenances: In areas of lighting fixtures at the exterior enclosures, provide a complete system of exterior enclosure work behind and circumventing the lighting fixtures or device meeting the "performance criteria" respectively for each specific contiguous wall system.

    a. Design, fabricate and install the exterior enclosure systems so that the completed exterior enclosures will incorporate and withstand the loads created by the lighting fixtures work.

    b. Provide exterior enclosure work at lighting fixture locations, coordinated with the requirements of those trades. Provide for re-lamping of lighting fixtures without the disassembly of exterior enclosure system. Provide mounting supports and other items required by the lighting fixtures.

20. Unacceptable Conditions: Vibration harmonics, wind whistles, noise or vibration created by thermal movement, structural movement, or wind; thermal movement transferred to building structure; loosening, weakening or failure of fasteners, attachments or other components.

21. Design Modifications: Make design modifications of work shown only as may be necessary to meet performance requirements and coordinate the work. Variations in details and materials which do not adversely affect appearance, durability or strength shall be submitted to the Professional for review. Maintain the general exterior design concept without altering profiles and alignments shown.

2.4 MATERIALS

A. General: Materials shall be new and free from defects that may impair the strength, functioning, durability or appearance of the Exterior Enclosure System or adjacent construction. Testing by an independent testing laboratory or review of data by the Professional shall not mitigate the Contractor's responsibility for performance of the Exterior Enclosure System nor relieve the Contractor of its responsibility to verify for himself that the work conforms to the Contract Documents.

2.5 FABRICATION

A. General: Fabricate exterior enclosure components to meet performance and aesthetic criteria specified. Fabricate exterior enclosure system at the manufacturer's shop to the fullest extent possible and before applying finishes. Fabricate system with materials proven compatible in testing specified.

B. Assembly: Carefully fit and assemble work with continuity of line and design, using rigidly secured joints with hairline contact, unless otherwise shown. Form butt hairline joints with roll-over edge exposed. Grind off roll-over edge flush with and matching of adjacent metal. Shop assemble work. Make all cutouts for penetrations at the factory and reinforce as required. Disassemble units too large for shipment and provide alignment and splice plates for accurate field fit.

C. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing. Exposed edges of metal shall be finished to match finish of face of work.

D. Reinforcing: Reinforce members and joints with structural shapes and plates in concealed locations, as necessary for adequate strength, sag resistance and rigidity and to comply with performance criteria. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts which will permanently prevent "freeze-up" of the joint. Fabrication of supporting steel elements shall be in accordance with AISC Manual of Standard Practice.

E. Changes of plane, parallel or transverse to longitudinal axis shall be accomplished as indicated in the factory with a minimum of field fabrication.

F. Fasteners: Prepare components to receive concealed fasteners, anchors and connection devices.

G. Fabricate mullions in sections not less than 1 story high. Insert compressible foam fillers into ends of every vertical mullion at each floor line to prevent convection currents within mullion tube.

H. Finishing: Ensure grain and extruding direction or rolling direction of aluminum is in same direction for visual appearance. Where applicable apply paint finish in same direction as grain and extruding direction of metal.

I. Moisture Drainage: Fabricate components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior. Reinforce members and joints with steel plates, bars, rods or angles for rigidity and strength as needed to fulfill performance requirements. Use concealed Series 300 stainless steel fasteners for jointing which cannot be welded.

J. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld before finishing components. 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.

K. Dissimilar Metals: Separate dissimilar metals with dielectric separator to prevent galvanic action. Do not extend coatings onto exposed surfaces

L. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to GANA’s "Sealant Manual" and "Glazing Manual."

M. Unitized Construction: Factory assemble unitized construction according to approved Shop Drawings to greatest extent possible. Rigidly secure nonmovement joints. Seal joints watertight, unless otherwise indicated. Assemble components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

N. Factory-Glazed Structural Silicone Glazing Work: Clean frames and glass surfaces with an approved solvent. Prime surfaces and apply structural sealant in accordance with manufacturer's recommendations and ASTM C1401 "Standard Guide for Structural Sealant Glazing." Clean excess structural sealant before curing. Do not transport units until silicone has cured.

1. Aluminum Finish at Structural Silicone Installations: Provide one of the following finishes

    a. Mill finish is not acceptable at structural silicone bonding surfaces.

    b. Aluminum surface to which structural silicone will be adhered shall have a finish which demonstrates by test the ability to satisfy specified requirements. Subject to demonstrated effectiveness by satisfactory testing, acceptable finishes are as follows.

        1) A paint conforming to AAMA 2605.

        2) Alodine conversion coating. The product used to form the alodine chemical conversion coating on aluminum extrusions or paneling shall conform with ASTM D1730, Type B, method 5 (amorphous chromium phosphate treatment) or method 7 (amorphous chromate treatment). Coating weight of chemical conversion coating shall conform with that specified in ASTM B449, section 6, class 1. Processing shall conform with that specified in ASTM B449, section 5.

        3) Architectural Class I anodizing conforming to AAMA 611.

PART 3 - EXECUTION

3.1 GENERAL

A. Manufacturer's Instructions: Prepare substrates, and erect the work of this Section, including components, and accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified, and where project conditions require extra precautions or provisions to ensure satisfactory performance of the Work.

3.2 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Ensure openings and recesses to receive work of this Section are within acceptable tolerances. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Substrate Acceptability: Commencement of installation shall constitute acceptance of substrate conditions by the Installer.

B. Anchor Assemblies: Furnish at times appropriate to the construction schedule, for installation by others, anchor assemblies, inserts and other anchorage components associated with and intended to support the exterior enclosure which are to be set into concrete, masonry or secured to structural steel framing.

1. After concrete is cast, the exact position of the embedded anchors shall be verified by the Contractor and the exterior enclosure erector and discrepancy or misalignment shall be reported to the Professional immediately upon discovery

for adjustment to be made. Subsequent submissions on remedial anchors shall be made at that time.

2. Unless otherwise indicated, work to be built into concrete or masonry shall be anchored with shop welded galvanized steel strap anchors. Work attached to structural steel shall be anchored by pre-welded members or bolts.

3. Make necessary modifications to the anchor ties to suit different site conditions of steel reinforcements without additional charge.

4. Provide additional anchorage assemblies insert in location adjacent to permanent anchors for pull out testing purposes. Install utilizing same system as permanent anchors. Show locations and numbers of test anchors on shop drawings for approval. Comply with "In-Situ Embeds and Anchor Testing" requirements specified in paragraph "Field Quality Control."

C. Dimension Verification: Verify dimensions of supporting structure by field measurements so that exterior enclosure work will be accurately designed, fabricated and fitted to the structure. Tolerances for supporting structure are specified in other Sections.

D. Coordination: Coordinate exterior enclosure work with the work of other Sections and provide items to be placed during the installation of other work at the proper time to avoid delays in the work. Place items, including inserts and anchors, accurately in relation to the final location of exterior enclosure components. Postpone work in areas required to be open for materials handling.

3.4 ERECTION

A. Assembly: Components shall be assembled, secured, anchored, reinforced, sealed and made weather tight in a manner not restricting thermal and wind movements of the system as well as building movements. Free and silent movement of components of the exterior cladding system due to these loads and movements shall be achieved without strain to glass, buckling of component or excessive stress to members or assemblies.

B. Erection: Erect components of the exterior enclosure in accordance with the manufacturer's written instructions and recommendations. Anchor components securely in place in the manner shown on the final shop drawings. Shim and allow for movement resulting from changes in thermal conditions and building movements. Provide separators and isolators to prevent corrosion, electrolytic deterioration, and freeze-up of moving joints.

1. At dynamic connections, where required, and unless otherwise shown, provide type 316 stainless steel for shims, blocking and spacers incorporating separators for dissimilar materials. Do not use horseshoe (U) shaped shims at dynamic connections.

2. Do not use plastic shims at structural connections. Stacking of shims shall not be permitted where conditions of structural failure may occur. Utilize solid shims where required.

C. Assumed Design Temperature: Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Fabrication and erection procedures shall take into account the ambient temperature at the time of the respective operations.

D. Fastening

1. Attachment of the wall to the structure shall be by approved methods in strict accordance with accepted shop and/or erection drawings. Supporting brackets shall be so designed as to provide three-dimensional adjustment and accurate location. Once the wall is properly positioned, connections so designated on accepted shop drawings shall be rigidly fixed by welding or other positive mechanical means.

2. Expansion anchorage shall be so designed to accommodate thermal and building movements. Anchorage design shall provide for unrestricted movement. Molybdenum-disulfide filled nylon ("Nylatron") slip pads or washers shall be used at thermal or dynamic anchors.

3. Anchor component parts securely in place by bolting, welding or other permanent mechanical attachment system, which will comply with performance requirements and permit movements which are intended or necessary. Install slip pads between moving parts.

4. Steel fasteners shall comply with requirements described herein. Welding shall be done by skilled mechanics qualified or licensed in accordance with local building regulations and shall conform to the recommended practices of the American Welding Society. Special care shall be taken to protect glass and other finished surfaces from damage and to prevent fires.

5. Weld spatter on glass or exposed surfaces will be cause for rejection of glass or other exposed material. Glass with weld spatter will be replaced at no cost to the Department.

6. Touch up welds or damage to structural steel coating with two (2) coats of an epoxy paint or zinc rich primer compatible with existing primer and as approved by the Professional.

7. Provide supplementary parts necessary to complete each item of work of attachments. Attachment devices shall be of type, size and spacing to suit condition and as approved by the Professional. Provide shims, slotted holes or other means necessary for leveling, plumbing and other required adjustments. Attachment devices for work exposed to view shall be concealed unless otherwise indicated. Where bolts or screws are permitted in work exposed to view, they shall match adjacent surfaces.

8. Do necessary drilling, tapping, cutting, shimming, welding or other preparations of surrounding construction on site accurately, neatly and as necessary for the attachment and support of work of this section.

9. Where design requires moving metal parts, parts shall be separated and coated or treated to ensure proper movement, without noise, binding or metal to metal contact. Isolate materials where necessary with 1/8 in. (minimum thickness) high impact polystyrene isolator pads to prevent electrolysis between dissimilar metals.

E. Field Installation of Preglazed Panels

1. Inspect each preglazed unit immediately before installation and eliminate pieces which have observable edge damage or face imperfections. Check frames to receive units for squareness and trueness. Verify that perimeter clearances are

sufficient to prevent "point loading" and that surfaces are clean, dry, and ready to receive preglazed units. Verify that frame corners are weather tight and that sills are drained to exterior. Remove protective coatings from framing surfaces.

2. Watertight and airtight installation of each preglazed unit is required. Each installation shall withstand failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

3. Protect glass from edge damage at times during handling, installation and operation of the building. Glass breakage during the guarantee period will be considered a form of faulty material or workmanship unless known to result from vandalism or other causes not related to materials and workmanship.

4. Preglazed units shall be stored in a dry, well-ventilated location. Handling of glass shall be kept to a minimum, and glass shall be carefully protected from soiling and from condensation.

5. Gaskets shall be vulcanized (injection molded) at corners where compatible with installation procedure. Where gasket joints occur, tightly butt end and seal with a compatible sealant.

6. Where applicable, comply with GANA Glazing Manual Guidelines. Provide a minimum nominal glass bite of 1/2 in.. Where joint movement will result in variable glass bite, increase nominal bite as required and provide 1/4 in. minimum edge clearance, or greater clearance where lateral building movement is taken by the glazing seals

7. Thoroughly clean glazing pocket before setting glass. Solvents shall be compatible with finished aluminum, glass and glazing materials. Place setting blocks at quarter points. Place side blocks in the upper half of each jamb, where required. Side blocks, setting blocks and chairs shall be positively retained in position.

8. Remove and replace stops and apply sealants as required for a complete glass installation. Details of installation shall permit replacement of glass after the construction period.

9. Defer glazing of openings which are obstructed during construction. Glaze openings when obstructions are removed.

10. Install wet seals, heel beads, toe beads, interior wet seals and structural silicone seals as indicated by architectural details.

11. Use pre-formed custom shape extruded silicone gasket at the butt glazed vision glass. Gasket is intended to prevent silicone contact with the PVB laminate. Gasket shall adhere to wet silicone.

12. Each and every piece of glass shall be subject to approval, and may be rejected after having been set or erected. Rejected glass shall be carefully removed and replaced with new suitable glass without delay and without cost to the Department. Piece or pieces damaged in the removal and resetting of defective or rejected pieces shall also be removed, with new and acceptable pieces provided and installed at no cost to the Department.

13. Remove and replace exterior glass lights which are broken, chipped, stained or

otherwise damaged including coating defects or which, in the opinion of the Professional, do not conform to the Specification requirements. Where directed, remove and replace lights which do not match adjoining work. Provide new matching lights, install as specified and seal joints to eliminate evidence of replacement.

F. Structural Silicone Glazed Units

1. Comply with manufacturer's instructions for protecting, handling, and installing fabricated structural sealant glazed exterior enclosure components, with particular care and attention to preservation of edges and sealants. Discard or remove and replace damaged members.

2. Prepare surfaces that will contact 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. Install structural sealant glazed exterior enclosure in accordance with approved shop drawings, using workers specifically trained in the installation of structural sealant glazed walls. Mechanically fasten glazing in place until structural sealant is cured.

3. Anchor components securely in place in the manner indicated. Shim and allow for movement resulting from changes in thermal conditions. Provide separators and isolators to prevent corrosion, electrolytic deterioration, and "freeze-up" of moving joints.

4. Structural silicone glazing work shall be assembled in the controlled environment of the fabricator's shop. No structural silicone glazing will fabricated in the field except as approved by the Professional.

5. Install secondary weatherseal sealant according to sealant manufacturer's written instructions to provide weatherproof joints between glazed units. Prime substrates and install joint fillers behind sealant as recommended by weatherseal sealant manufacturer.

6. Field-Glazed Structural Silicone Glazing Remedial Work: In accordance with fabricator’s submitted re-glazing procedure, clean frames and glass surfaces with an approved solvent. Prime surfaces and apply structural sealant in accordance with manufacturer's written recommendations. Clean excess structural sealant before curing. Mechanically hold glass firmly in place until sealant is sufficiently cured. Install compressible backer rods in joint before applying weatherseal sealant.

G. Coordinate and provide items, in a timely manner so as to allow for the installation and protection of specified roofing systems specified elsewhere.

H. Erection Tolerances: Erect component parts within the following tolerances:

1. Variations from plumb or angle shown: 1/8 in. maximum variation in story height or 10 ft run, noncumulative.

2. Variations from level or slopes shown: 1/8 in. maximum variation in column-to-column space or 20 ft. run, noncumulative.

3. Variations from theoretical calculated position as located in plan or elevation in

relation to established floor lines, column lines and other fixed elements of the structure, including variations from plumb and level: 1/4 in. maximum variation in column-to-column space, floor-to-floor height or 20 ft. run.

4. Offsets in end-to-end or edge-to-edge alignment of consecutive members: 1/16 in. maximum offset in alignment.

5. Variations from Position at the Hypotenuse: Variation from theoretical calculated position at the hypotenuse of rectangular bay between mullions in story height.

   a. 1/4 in. maximum variation in 10 ft. length of hypotenuse, noncumulative.

   b. 3/8 in. maximum total variation in hypotenuse

6. Erection tolerances shall include provisions for creep and shrinkage of building frame where specified.

I. Cutting and Trimming of Components: Cut and trim components of the exterior enclosure during erection only with the approval of the manufacturer or fabricator and in accordance with its recommendations. Do not cut through reinforcing or prestressing members. Restore finish completely to protect material and remove evidence of cutting and trimming. Remove and replace members where cutting and trimming has impaired strength or appearance.

J. Damaged Components: Do not erect members or other components which are warped, bowed, deformed or otherwise damaged to extent as to impair strength or appearance. Remove and replace members damaged in the process of erection.

K. Setting of Units: Set units level, plumb, and true to line, with uniform joints. Support on metal shims and secure in place by bolting to clip angles and similar supports anchored to supporting structure.

L. Dielectric Separation: Paint concealed contact surfaces of dissimilar materials with a heavy coating of dielectric separator (bituminous paint) or provide other separation in accordance with manufacturer's recommendations.

M. Welding: Weld with electrodes and by methods recommended by manufacturer of material being welded, and in accordance with appropriate recommendations of the AWS. Use only methods which will avoid distortion or discoloration of exposed faces. Grind exposed welds smooth, using only clean wheels and compounds which are free of iron or iron compounds. Restore finish of components after welding and grinding.

N. Soldering and Brazing: Solder and braze only to fill or seal joints (not to form structural joints) and in accordance with component manufacturer's recommendations. Grind smooth and restore finish.

O. Painting of Ferrous Metal Items: Paint clip angles and other ferrous metal parts with primer specified in Section 084400 "Curtain Wall and Glazed Assemblies."

P. Trim: For exterior enclosure utilizing exposed exterior mullion covers of the snap-on type design, provide a minimum of two (2) concealed fasteners per 5 ft. length to prevent displacement or accidental removal of trim. Show location of fasteners on shop drawings.

Q. Firestopping/Safing and Smoke Seals: Clean debris from behind exterior enclosure during erection and provide temporary closures to prevent accumulation of debris. Install

firestopping/safing to comply with local authorities having jurisdictions. Install firestopping/safing with securely anchored metal flanges or make equivalent provisions to prevent dislocation. Install smoke seal over safing insulation so as to provide a complete smoke seal. Comply with Section 078400 "Firestopping", appropriate UL listing and local authorities having jurisdiction.

R. Joint Sealant: Seal joints in exterior enclosure in accordance with Section 079200 "Joint Sealants", in a concealed manner, unless exposed sealant is shown.

3.5 FIELD QUALITY CONTROL

A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.

B. Contractor's Testing and Inspection Program: The Contractor shall provide and maintain an effective Quality Control program and perform sufficient inspections, surveys and tests of items of Work, including those of other trades, to ensure compliance with the Contract Documents and the requirements of the local authorities having jurisdiction. Furnish appropriate facilities, accurately calibrated instruments and testing devices required to perform the quality control operations and with sufficient work forces to cover the construction operations within the actual construction sequences. Coordinate this work with the quality control requirements of other technical Sections of the Specifications and with requirements of the Department and governing authorities having jurisdiction.

C. Contractor Off-Site Testing

1. Exterior enclosure Mock-Ups Testing: The Contractor shall perform mock-up construction and testing, for each specific exterior enclosure system utilized on the Project.

D. Contractor's Site Testing: The Contractor shall perform the following site testing of the exterior enclosure at times appropriate to the construction schedule and in compliance with direction of the Professional and the Department's independent testing agency:

1. In-Situ Embeds and Anchor Testing: Verify the adequacy of the embeds and anchorage to the base building structure by means of pull out, shear, tension and seismic testing in accordance with ASTM E488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements" on representative in-situ embeds and anchors for the exterior enclosure systems.

a. Loading for the testing shall be for the design load and 150% of design load to most closely replicate the forces the exterior enclosure system will exert on the anchors and embeds (shear, tension, static, seismic, etc. as required to indicate compliance with specified performance criteria). In the case of plate embeds, the forces shall be delivered in a manner similar to that which will occur in the application, as demonstrated to the satisfaction of the Professional.

b. Test specimens shall be located adjacent to actual anchors but shall not be utilized for actual anchorage of panels. At completion of testing and after approval has been received, remove test anchor specimens and restore structure to match adjacent areas in every aspect.

c. Number of tests shall be as determined by the Professional based on the complexity of the embeds and anchor designs, but shall not be less than

3% of the total of each anchor type but no fewer than five (5) anchors shall be tested. Failure of embeds or anchors shall require further testing to ascertain the extent of the problem. Amount of additional testing shall be as determined by the Professional.

2. Structural Silicone Sealant Adhesion Test: Test installed structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)." Test a minimum of 2 areas on each building face.

3. Field Water Penetration Testing: After completion of the exterior enclosure installation and nominal curing of sealant and glazing compounds, and when and where directed, test for water leakage: Conduct tests in the presence of the Professional, The Contractor, the Department's Testing Agency, the exterior enclosure fabricator/erector and other subcontractors involved in the Work. Correct deficiencies observed as a result of this testing.

4. Water Hose Field Penetration Test: After completion of the installation and nominal curing of sealants and glazing compounds, and before installation of interior trim members, finishes and heating unit covers, test for water leaks by performance of AAMA 501.2 "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Wall and Sloped Glazing Systems" (with the exception of the definition of uncontrolled water). Provide powered scaffold, hose, radios, water supply and manpower to perform at least four (4) successful tests, plus repeat testing of unsuccessful tests.

    a. Test wall at initial install of one fully surrounded panel at 5%, 10%, 25%, 50%, and 90% completion.

    b. Schedule work necessary, as out of sequence sealant work, so that the wall can be tested as specified. There shall be no unacceptable water leakage as defined herein. Depending upon the prevalence or absence of leakage in the initial water penetration test and upon measures adopted by the Contractor to eliminate source of leakage, Professional will determine necessity for, and scope of, additional tests and test methods. In no case will the total of tested area amount to less than 1% or less than 3 per elevation nor more than 10% except in cases of chronic leakage or as authorized by the Department. Conduct tests in the presence of the Professional. Correct deficiencies observed as a result of this test.

5. Pressure Chamber Field Tests: Furnish portable test apparatus in accordance with AAMA 503, consisting of a pressurized enclosure sealed against the exterior enclosure on the indoor side, and a spray rack of pipe grid with nozzles to spray water onto the exterior of the wall. Provide test apparatus equivalent in size to mock-up, unless directed otherwise.

    a. Test one unit of every wall type on every building as randomly chosen by the Professional at the installation milestones indicated below.

    b. Air Infiltration: Test for resistance to air infiltration using static air pressure difference in accordance with AAMA 503 and ASTM E783 "Field Measurement of Air Leakage Through Installed Exterior Windows and Doors." Test at 6.24 psf test pressure.

    c. Water Penetration Test Method: Test for water penetration in accordance

with AAMA 503 and ASTM E1105 requirements. Test at pressure at 20% of design pressure or 15 psf , whichever is greater.

d. Test Locations: Test areas shall be within the first 3 levels of a typical exterior enclosure construction at locations indicated by Professional, during installation of exterior enclosure. Perform tests after completion of the installation and nominal curing of sealants, and before installation of interior trim members and heating unit covers. Conduct tests in the presence of the Professional, who will determine the actual percentage of wall area to be tested based upon indication of leakage or lack thereof. Conduct one successful test for each location.

e. Test wall at initial install of one fully surrounded panel (9 panels total) at 5%, 25%, and 90% completion.

1) Test schedule includes each building and at each test point in schedule.

6. Post-Test Procedures: Repair or replace components, including joints and sealants, which leak or are observed to be defective, and retest as directed. Furnish a full written report of the testing procedures, results, and revisions or corrective procedures that shall be followed as a result of the testing.

3.6 DEPARTMENT'S QUALITY ASSURANCE SERVICES

A. Quality Assurance Services: Independent Testing and Inspection Agency(ies), engaged at the Department's expense through the Professional, will perform the following activities to monitor the Contractor's Quality Control Services. The Department's Quality Assurance Services monitoring of activities do not relieve the Contractor of responsibilities under the Contract.

B. Contractor's Assistance to the Quality Assurance Services: Furnish the Department's Quality Assurance Services with access to the Work, materials and facilities as required by the Agency(ies). Provide adequate notice of construction activities to allow timely inspections and observation of Contractor tests, and be available for pre-installation meetings. Furnish the Department's Testing and Inspection Agency(ies), with on-site office facilities.

C. The Departments Testing Agency shall perform full-time inspection and testing of the exterior enclosure work during construction at timely occurrences to satisfy governing authority having jurisdiction and the quality control established for the Project by the Contract Documents.

D. The Department's Testing Agency work includes but is not limited to the following:

1. Weld Testing: Non-destructive testing of exterior enclosure welds, utilizing one of the following test methods which best suits the types of welds to be tested.

a. Liquid penetrant test.

b. Magnetic particle test.

c. Radiographic test.

d. Ultrasonic test.

2. Paint Testing: Testing to determine the total dry film thickness of coatings applied to painted ferrous metal members. Shop and site test units at random locations throughout construction.

3. Inspection Compliance: Verification of the compliance of; or the deficiencies of the following:

    a. Building Superstructure: Examination surveys of the superstructure substrates and supports to receive the exterior enclosure and applicable corrective work performed. Verification that the supporting structure is properly aligned and within the designed tolerances and without missing or mislocated inserts.

    b. Exterior enclosure Framing Components: Verification that the framing components are properly sized and aligned, are without missing or mislocated anchoring provisions and are without structural defects. Verification that primed and painted components are provided with the specified materials.

    c. Connections and Anchors: Verification that anchors are properly placed, welded or bolted. Verification that correct anchoring and/or materials are used in lieu of others where there are field changes. Inspection of welding and bolting where connections are stressed to 50% or more of allowable values. Verification of the calibration of wrenches, review of bolting procedures and inspection of joint surfaces prior to bolting for bolted connections related to the exterior enclosure. Verification of welder's license, qualifications and welding procedures for welds related to the exterior enclosure. Verification of proper welding or bolting of reset connections.

    d. Joints and Sealants: Verification that horizontal and vertical movement joints have been provided, and verification that joints are free from obstructions. Confirmation that accepted sealant materials are provided. Verification that sealant joints are properly sealed, and that materials are of sufficient elongation for movement anticipated. The recording of unanticipated movement or displacement beyond performance criteria.

    e. Glass and Glazing: Verification that the vision and spandrel glass is not defective, that coatings and decorative ceramic frit are on the correct surface of insulating glass units and that the glazing gaskets (and structural silicone sealants) meet specifications. Verification that edge deletions of coatings on insulating glass units, where necessary, have been performed correctly and that seals (both primary and secondary) are correctly situated. Verification that the location and size of setting and edge blocks are suitable and meet specifications.

    f. Flashings and Drainage: Verification that flashings are the proper materials, are properly installed and that end dams are sealed. Verification that weeps and tubes are installed and are functional.

    g. Fire Safing: Verification of the continuity of fire safing installation. Verification that the fire safing is properly sealed at joints and penetrations to maintain the continuity of the fire barrier at the exterior enclosure.

h. Exterior enclosure Insulation: Verification that insulation is continuous and properly sealed at joints and penetrations to maintain the continuity of the vapor barrier.

i. Welding: Verification that welds are correctly completed.

j. Window Cleaning: Verification of window cleaning track tolerances and clearances so as to confirm proper functioning of the window cleaning equipment.

4. Observation Compliance of Exterior Enclosure Subcontractor's Testing Program

a. Testing Mock-Ups: Observation, as the Department's representative, of mock-up construction and mock-up testing of exterior enclosure assembly, for the required testing.

5. Site Testing: Observation, as the Department's representative, of the following site testing:

a. Water Hose Field Penetration Tests: Water hose field penetration testing of exterior enclosure assembly, for the required Water Hose Penetration Test: AAMA 501.2 as specified herein.

b. Pressure Chamber Field Tests: Site testing of exterior enclosure assembly, for the required Site Water Penetration Chamber Test: AAMA 503 under pressure differential as specified herein.

c. Embedded Anchor Testing Site Tests: Site testing of embedded anchor testing.

d. Structural Silicone Testing: Site testing for structural silicone sealant adhesion tests.

3.7 CLEANING

C. In addition to specific protection and cleaning methods required for each component by the respective Sections of these Specifications maintain the exterior enclosure throughout the construction period in a clean and properly protected condition so that it will not be damaged at the time of acceptance by the Department.

D. Cleaning and protective methods shall be carefully selected, applied and maintained so that finishes will not become uneven or otherwise impaired as a result of unequal exposure to light and weathering conditions.

E. Final Cleaning: Clean the completed system, inside and out, promptly after erection and installation of glass and sealants, allowing for nominal curing of liquid sealants. At no point shall water be allowed to pond onto any exterior component. Final cleaning shall be completed to the total satisfaction of the Department.

3.8 PROTECTION

C. Contractor responsible for protection of exterior enclosure system from damage after erection until Substantial Completion. Remove and replace damaged or broken glass before Substantial Completion at no expense to Department.

END OF SECTION

SECTION 113000

RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Stipulations:

1. The specifications sections “General Conditions to the Construction Contract”, “Special Conditions” and “Division 01 - General Requirements” form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. General: Provide residential appliances and installation provisions for appliances supplied by Department in accordance with requirements of the Contract Documents.

A. Section includes, but not limited to, the following:

1. **REQ-01**: Washing Machine.

2. **REQ-02**: Dryer.

3. **REQ-03** through **REQ-08**: Residential appliances.

B. Related Requirements:

1. All necessary roughing-in required for the appliances as specified in Section 055000 “Metal Fabrications.”

2. All necessary roughing-in of mechanical, plumbing, and electrical connections required for the appliances complete with final connections, including electrical, communications and other utility line connections required to properly operate the appliances specified herein.

3. Finish painting of exposed metal surfaces requiring painting other than prefinished items is specified in Section 099100, "Painting".

C. Sustainable Design Requirements: Provide the Work, and submit documentation, as necessary for compliance with sustainable requirements specified in Section 018113, “Sustainable Design Requirements”.

1.2 DEFINITIONS

A. Department Furnished Contractor Installed (OFCI): Appliances that will be furnished by the Department for installation by the Contractor. The Contractor shall be responsible for coordinating substrate and installation requirements as well as coordinating appliance dimensions. The Contractor shall be responsible for mechanical, electrical, and A/V connections as well as final installation and integration of these appliances with the Work.

1.3 REFERENCES

A. General: Comply with the applicable provisions of the referenced standards except as

modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of conflict between referenced standards, this specification or within themselves, the more stringent standard or requirement shall govern.

1. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM "Metal Finishes Manual".

2. Industrial Fasteners Institute (IFI): "Fastener Standards Book."

1.4 **SUBMITTALS**

A. Product Data: Submit manufacturer's literature, specifications and installation instructions describing the general properties of each piece of appliance and accessory to be used in the Work.

B. Shop Drawings: Submit shop drawings for the fabrication and installation of the Work including details of each type of appliance, anchorage and accessory items. Prepare details at not less than 3 in. = 1 ft. minimum scale.

C. Samples: Furnish sufficient samples to establish the full range of colors and textures for materials exposed in the finished work. Compliance with other requirements is the responsibility of the Contractor. Submit the following:

D. Closeout Submittals: submit the following:

1. Warranties: Submit warranties as specified.

2. Maintenance Data: Submit the following:

a. Maintenance schedule for all operable appliances.

b. Maintenance Manuals: Two (2) copies of bound maintenance manuals, describing the materials, and procedures for cleaning and maintaining each piece of equipment. Include manufacturer's data describing the materials and finishes used in the work including parts lists.

1.5 **QUALITY CONTROL**

A. Qualified Installer: The residential appliances work shall be performed by a firm having 5 years experience in the installation of specified appliances on comparable projects. The installer shall provide evidence of successful completion of work of similar scope to that shown and specified for this Project using similar appliances and as approved by product manufacturers.

B. Sole Source Responsibility: Obtain appliances from one source of a single manufacturer for each piece of appliances for the entire project. Each manufacturer shall furnish evidence that the specified materials have been manufactured by the same source and successfully utilized on a yearly basis for a minimum of 5 years on projects of a similar scope to that shown and specified for this Project.

1. The catalog numbers specified herein are from the current catalogs of the respective manufacturers and establish minimum standards of design, dimension and quality unless otherwise modified. Appliances manufactured by others will be

considered provided all requirements specified herein are satisfied.

C. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from authorities having jurisdiction

D. Pre-Installation Meeting: Prior to the start of the Work, meet at the Project site to review material selections, methods and sequence of installation, special details and conditions, standard of workmanship, quality control requirements, job organization, coordination with other trades, and other pertinent topics related to the Work.

1.6 **DELIVERY, STORAGE, AND HANDLING**

A. Packing, Shipping, Handling, and Unloading: Pack, ship and handle components in accordance with manufacturer's instructions. Protect appliances and components during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration. Do not deliver appliances until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate appliances have been completed in installation areas.

B. Storage and Protection: Store components in a dry, well ventilated space, off the ground and covered with non-staining protective wrapping. Cover and keep covered with non-staining protective wrapping.

1.7 **WARRANTIE**S

A. General: Warranties and guaranties specified in this Article shall not deprive the Department of other rights the Department may have under other provisions of the Contract Documents and are in addition to and run concurrent with other warranties and guaranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 **Residential Appliances**

A. Washer (**Type REQ-01**): Provide the following or approved equal:

1. Manufacturer:

a. Maytag
Single Load Front-Load Washer -60hz
MHN33PRCWW
No Coin Drop or Card Reader
208v Electrical Kit

b. Whirlpool
3.1 cu. ft. High-Efficiency White Front Load Commercial Washing

c. Speed Queen
Electric Homestyle Front Load Washer

B. Dryer (**Type REQ-02**): Provide the following or approved equal:

1. Manufacturer:

a. Maytag
Commercial Electrical Large Capacity Stack Dryer
MLE26PRBYW
No Coin Drop or Card Reader
208v Electrical Kit

b. Whirlpool
Whirlpool Commercial 7.4 Cu Ft Commercial Electric Dryer
CSP2970HQ

c. Speed Queen
Electric Homestyle Stacked Double Dryer

C. Microwave (**Type REQ-03**): **Not Used (FF&E)** ~~Provide the following or approved equal:~~

~~1. Manufacturer: TBD~~

D. Full Size Refrigerator (**Type REQ-04**): Provide the following or approved equal:

1. Manufacturer:

a. Maytag
33-Inch Wide Top Freezer Refrigerator With Evenair™ Cooling Tower-21 Cu. Ft.
MRT711SMFZ

b. LG
Top Freezer Refrigerator
LRTLS2403S

c. WHIRLPOOL
33-inch Wide Top Freezer Refrigerator - 21 cu. ft.
WRT541SZDZ

E. Mini Refrigerator (Type REQ-05): Provide the following or approved equal, integrated into architectural woodwork:

1. Manufacturer:

a. Walsh
Compact Refrigerator
WSR35S1

b. Magic Chef
Mini Refrigerator
HMR440SE

c. WHIRLPOOL
Mini Refrigerator
WHR31TS4E

~~E. **Type REQ-05**: Not Used.~~

F. Coffee Maker (Type REQ-06): See Food Service Documents.

~~F.~~**G.** Dishwasher – 24 in. (**Type REQ-07~~6~~**): Provide the following or approved equal:

1. Manufacturer:

   a. Maytag
      MDB9959SKZ

   b. LG
      LSDTS9882S

   c. WHIRLPOOL
      WDF550SAHS

~~G.~~**H.** Under Counter Ice Maker (**Type REQ-08~~7~~**): Provide the following or approved equal:

1. Manufacturer:

   a. HOSHIZAKI 31 ½ in.
      AM-50BAJ-AD

   b. ICE-O-MATIC 31 in.
      UCG100A

PART 3 - EXECUTION

3.1 GENERAL

A. Manufacturer's Instructions: Prepare substrates and erect the work of this Section, including appliances, components, and accessories in accordance with the manufacturer's instructions, except where more stringent requirements are shown or specified, and where project conditions require extra precautions or provisions to ensure satisfactory performance of the Work.

3.2 EXAMINATION

A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Substrate Acceptability: Commencement of installation shall constitute acceptance of substrate conditions by the Installer

B. Deliver items which are to be built into the work of other sections in time so as not to delay the progress of the Work.

3.4 INSTALLATION

A. Install the Work of this Section in accordance with manufacturer's written installation instructions, so that completed installation is in perfect operating condition.

B. Install operating appliances complete with necessary hardware, anchors, inserts, hangers, and appliances supports in accordance with final shop drawings, manufacturer's written instructions, and as specified herein. Install items within the clearances and space limitations shown.

C. Perform all necessary cutting, drilling and fitting required to accommodate electrical and mechanical services.

D. Uncrate appliances and anchor or fasten to floors, walls or ceilings as required. Make appliances complete and ready to receive final utility connections. Appliances set in place level and true.

E. Dimensions shown on Drawings are based on an assumed design temperature of 70 deg. F. Fabrication and erection procedures shall take into account the ambient temperature range at the time of the respective operations.

F. Do not erect members which are warped, bowed, deformed or otherwise damaged to such extent as to impair strength or appearance. Remove and replace members damaged in the process of erection.

G. Dielectric Separator: Separate dissimilar metals and metals in contact with concrete or masonry with a dielectric separator.

H. Touch-up marred and abraded surfaces with the specified prime paint after erection in the field. Touch-up galvanized surfaces in accordance with ASTM A780.

3.5 TESTS

A. Start-up, adjust and test appliances to demonstrate compliance with specified performance requirements of the specifications.

3.6 CLEANING

A. At a time as directed by the Department, remove all temporary protection and leave the installation clean and free of any imperfections.

END OF SECTION

SECTION 310901

MONITORING OF STRUCTURES & UTILITIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SUMMARY

A. All labor, materials, equipment, and accessories necessary for the completion of all monitoring work as shown on Contract Drawings, as specified herein, and as required by the conditions at the site, are a part of the Contract.

B. The Work of this Section includes, but is not limited to the following:

1. All labor, equipment, and materials to execute the work of this Section as specified herein.

2. Collection, cataloging, and compilation of existing buildings, infrastructure, and other structures to remain within 100 feet (horizontally) of the **soil nail wall excavation (**i.e., Pre-Construction Conditions Documentation).

3. Furnish and install optical survey targets, surveying marks, inclinometers, seismographs, benchmarks, and settlement monitoring points as required and as outlined herein.

4. Furnish all equipment and labor to provide continuous vibration monitoring within adjacent structures.

5. Provide all surveying services required for performing optical survey monitoring as outlined herein.

6. Provide all labor necessary for the periodic measurement of any crack gauges installed under this Section.

7. Compilation and transmittal of monitoring data during construction.

8. Provide all other labor, equipment, and materials as can reasonably be inferred to make the work of this Section complete.

C. Related Documents:

1. Work governed by this section, as shown or specified shall be in accordance with the requirements of the Contract Documents.

1.3 RELATED SECTIONS

A. Drawings and general provisions of the Contract apply to this Section.

B. Related Documents and Sections: Examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to the following:

1. 310000 – Earthwork

2. 313236 – Permanent Soil Nail Wall

3. Monitoring Plan – To be developed by the Contractor.

1.4 SUBMITTALS

A. Unless otherwise indicated, transmit all submittals to the Department for review by the Department's Professionals before proceeding with ordering, fabricating, or any other work of this Section.

B. Submittal review will be of concept only and shall not in any way diminish or limit Contractor's responsibility for the quality and performance of his work. All material orders are the sole responsibility of the Contractor.

C. Submit method statement describing the type of equipment to be implemented for optical surveying, crack gauges, and any other instrumentation proposed. Describe installation, location, operation, and maintenance of equipment, as necessary.

D. Submit work plan detailing the installation, operation, and maintenance of all equipment.

E. Submit product cut-sheets and calibration data and identify the allowable tolerances of all proposed equipment.

F. The Contractor shall submit resumes for all personnel performing the Work of this Section.

G. Submit Pre-Construction Documentation Reports to the Department for distribution to the Department's Professionals. Documentation shall include all applicable plans, sketches, notes, and photographs logging the conditions of all structures and thoroughfares located within 100 feet of the **soil nail wall excavation.**

H. Submit plan showing location of all instrumentation, and crack gauges installed to document movement during construction.

I. Monitoring Plans:

1. Where applicable, the Contractor shall submit drawings showing the plan and vertical locations of all proposed monitoring points. The plan shall graphically identify the type of monitoring point (i.e. optical survey, surface points, seismographs, crack gauges, borehole instruments, benchmarks, etc.), with each monitoring point bearing a unique identification number. Where required, provide section drawings (i.e. excavation faces, building facades, etc.) and identify the elevations at which monitoring points have been or will be installed.

2. The drawings shall be updated and resubmitted in the event that monitoring points are abandoned, relocated, or additional monitoring points are added.

J. Submit sample survey monitoring report.

K. Submit all monitoring data directly to the Department for distribution to the Department's Professionals. Measurement data shall be submitted within 24 hours of taking each reading. All data shall be transmitted in electronic format suitable to the Department's Professionals. Transmitted data shall show all cumulative measurements recorded as a function of time. Requisite notes shall be included to document temperature and construction activities performed during the monitoring increment.

1.5 QUALITY ASSURANCE

A. The Contractor shall retain the services of a Land Surveyor, licensed in the Commonwealth of Pennsylvania to perform all survey monitoring during construction. The Contractor's surveyor shall have at least three years of professional experience or as approved by the Department's Professional.

B. The Contractor shall retain the services of a qualified Engineer, licensed in the Commonwealth of Pennsylvania, to evaluate and report all monitoring data during construction. The Contractor's Engineer shall have at least three years of professional experience or as approved by the Department's Professional.

C. Codes and Permits:

1. Comply with Federal, State, or Local codes and ordinances having jurisdiction.

2. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.

1.6 SCHEDULING OF WORK

A. Obtain all necessary permits and access agreements necessary prior to performance of the Work.

B. Pre-Construction Conditions Documentation of all adjacent structures shall be completed at least 10 days, but no more than 60 days, prior to commencing construction, including but not limited to general earthwork, support of excavation installation, underpinning, or other support of excavation related construction.

C. Locations for crack gauges shall be determined during performance of the Pre-Construction Conditions Documentation. Crack gauges shall be installed as required to catalog and record the conditions of existing cracks.

D. Seismographs shall be installed during or after performance of Pre-Construction Conditions Documentation. Seismographs shall be installed to allow for sufficient time to evaluate background vibration levels.

E. Additional crack gauges or seismographs shall be installed as required for construction activities.

F. Survey targets, benchmarks and settlement monitoring points shall be installed at least 10 days before commencing construction, including but not limited to general earthwork, installation of support of excavation, underpinning, or other support of excavation related construction.

G. Additional monitoring points shall be established as required during construction.

1.7 GENERAL MONITORING

A. General monitoring shall include but not be limited to measurement of construction induced vibrations, vertical and lateral deflection of structures and utilities, inclination, soil/ground movement, and crack movement. Monitoring shall be performed prior to and during construction to evaluate the performance of the Contractor's activities.

B. The field locations for all monitoring devices shall be coordinated with the Department, Department's Professionals, and all agencies having jurisdiction.

C. The Contractor shall be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of construction activities.

D. All general monitoring data shall be transmitted to the Department for distribution to the Department's Professionals, and all other agencies having jurisdiction.

1.8 VIBRATION AND CRACK MONITORING

A. Monitoring shall include construction vibrations and periodic measurement of existing cracks, where present. Monitoring shall be performed prior to and during construction to evaluate the performance of the Contractor's activities.

B. The field locations of seismographs and crack gages shall be coordinated with the Department, Department's Professionals, and all other agencies having jurisdiction.

1. A minimum of one seismograph is required at the corner of the existing **academy** building **to remain** closest to the proposed **soil nail excavation.**

2. Crack gages must be installed at all cracks identified during the pre-construction survey of the existing building.

C. The Contractor shall be responsible for all maintenance of equipment as required to maintain monitoring on a continuous basis throughout the duration of construction activities on-site.

D. Crack monitoring data shall be transmitted to the Department for distribution to the Department's Professionals, and all other agencies having jurisdiction.

E. Vibration monitoring data shall be transmitted to The Department for distribution to the Department's Professionals, and all other agencies having jurisdiction.

1.9 SURVEY MONITORING

A. Survey monitoring shall include installation of survey monitoring points and periodic measurement of horizontal and vertical movements. The final location of survey monitoring points shall be established by the Contractor, but at a minimum shall include monitoring points spaced at 25-foot intervals along the exterior walls where the existing building **to remain** adjacent to the **soil nail excavation** area **is within 100 feet**.

B. Survey monitoring data shall be transmitted to the Department for distribution to the Department's Professionals, and all other agencies having jurisdiction.

1.10 ADDITIONS

A. The Contractor may elect to provide additional types of monitoring not specifically outlined herein, but shall at a minimum conform to the requirements of this Section. Where additional types of monitoring are proposed, the Contractor shall inform the Department in writing, and shall provide all information as requested by the Department and the Department's Professionals, and all other agencies having jurisdiction.

B. The Contractor is solely responsible for all means and methods not specifically addressed herein.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Contractor shall submit all details and other supporting data for materials proposed for use in performing the Work of this Section.

1. Optical Survey Targets: Survey targets shall consist of self-adhesive reflective sheet targets suitable for adherence to wood, steel, brick, concrete, etc.

2. Surface Marker 1 (SM1): A 1/4 inch by 2 inch PK nail set in paved streets or sidewalks with a 1-1/2 inch diameter hub identification tag (or approved equal).

3. Surface Marker 2 (SM2): Scribe surface of monitoring point as required to maintain permanent demarcation of the location. Scribed locations shall be identified on all drawings.

B. Seismographs: Minimate Pro portable seismograph as manufactured by Instantel Inc. (or approved equal). Seismographs shall include a cellular modem or other means to allow for continuous real-time monitoring and alert via email and internet. Geophones and cases shall be affixed to the walls or other structures by means of concrete anchor bolts as manufactured by Hilti, Redhead, or equal. Portable units, mounted directly on the ground, shall be installed in accordance with manufacturer's requirements.

C. Crack Gages: Grid crack cages shall be as manufactured by Avongard Products (USA) Ltd. (or approved equal). Anchors, bolts, screws and quick setting epoxy shall be as provided by Avongard Products (or approved equal). A minimum of 20 gauges shall be procured before execution of Preconstruction Conditions Documentation.

D. Optical Survey Equipment: Optical surveying equipment shall be suitable for achieving the following accuracies and repeatability:

1. Vertical: at least plus or minus 0.005 feet

2. Horizontal: at least plus or minus 0.005 feet

E. All proposed materials and equipment shall be submitted to the Department for review by the Department's Professionals before procurement or delivery to the site.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Install monitoring systems before commencing construction activities.

B. Install all equipment in accordance with manufacturer's recommendations.

C. Submit drawings showing the as-built locations for all monitoring points installed, listing unique identifiers for each point, and the type of monitoring.

D. Install additional monitoring points as required as the work progresses. Replace all locations that are lost, damaged, or vandalized.

E. Monitoring equipment shall be installed in accordance with the manufacturers' recommendation and the Contractor's work plan.

3.2 INSTALLATION OF CRACK GAUGES

A. Cracks shall be photographed and mapped before installing crack gages. The location of crack gages shall be made in consultation with the Department's Professional and all other agencies having jurisdiction.

B. Installation shall be in accordance with the manufacturer's recommendations.

C. Write ID # on gauge with permanent marker.

D. After completion of installation, check that gauge parts are free to move over each other by passing a feeler gauge or thin plastic card between the two sections.

E. After completion of installation, the as-built location and initial movement (if any) shall be recorded.

F. Photograph crack gauge after installation and during all subsequent readings.

3.3 MONITORING LOCATIONS

A. The minimum number of locations and approximate orientation of all monitoring points shall be as outlined below:

1. Buildings and Structures adjoining the proposed construction – including underpinning (as applicable):

a. Survey Targets or Survey Marks: Monitoring locations shall be evenly spaced at 25 feet on center at the base and roofline of **the existing building to remain in an area within 100 feet from the soil nail excavation** to determine movement in critical areas such as cracked facades, etc.

b. Crack Gauges: Monitoring points shall be installed at cracks observed during execution of Pre-Construction Conditions Documentation and as required as the work progresses, as determined by the Contractor, and as directed the Department and Department's Professionals, and all other agencies having jurisdiction.

c. Seismographs: Install seismographs as directed by the Department's Professionals. **A minimum of one seismograph shall be installed in**

the existing building to remain within 100 feet of the soil nail wall excavation.

2. Soil Nail Wall:

   a. In accordance with the **soil nail wall** designer **engineer's** requirements.

3.4 BASELINE MEASUREMENTS

A. Baseline measurements for all monitoring shall begin a minimum of 10 days before construction starts.

B. Establishment of trigger values for vibration monitoring shall consider background vibration levels. Background levels shall be recorded prior to commencing construction activities to determine ambient levels of vibration resulting from typical daily operations. Trigger values for seismographs shall be maintained at 0.5 inches per second above that of the peak background levels recorded.

3.5 FREQUENCY OF MONITORING

A. At a minimum, survey monitoring shall be performed once weekly during construction. The frequency of monitoring shall be increased or decreased as directed by the Department and the Department's Professionals, and all other agencies having jurisdiction pending the results of recorded monitoring data trends.

B. At a minimum, crack gauges shall be read and recorded on a weekly basis. The frequency of monitoring shall be increased as directed by the Department, the Department's Professionals, and all other agencies having jurisdiction.

C. Vibration Monitoring shall be performed on a continuous basis (24 hours per day, 7 days per week).

3.6 DATA FORMAT, TRANSMITTAL, AND REPORTING

A. Data shall be transmitted in an electronic format (MS Excel) and shall include all cumulative readings taken. Data shall include baseline values, offset measurements. Provide coordinates for readings, as requested. Include the following information for all readings:

   1. Instrument Type.

   2. Date and time of readings.

   3. Name of observer.

   4. Monitoring Point ID #.

   5. Readings.

   6. Incremental and cumulative deviation of readings.

   7. Weather conditions and temperature.

   8. Remark of any visual observations of conditions, construction activities.

9. Clear identification of any exceedances relative to the review and limit levels described herein.

B. Transmit all data to the Department for distribution to the Department's Professionals, and all other agencies having jurisdiction within 24 hours of taking measurements. Contact The Department, the Department's Professionals, and all other agencies having jurisdiction immediately in the event that values exceed threshold values specified herein.

C. A summary report shall be prepared on a monthly basis describing the monitoring results along with supporting graphs and figures. The report shall maintain a timeline of general construction activities, shall note any recorded exceedances relative to the review and limit levels provided, and shall note any necessary corrective actions taken by the Contractor.

3.7 REVIEW AND LIMIT VALUES

A. The following criteria shall be used to evaluate the necessity for modifying or ceasing construction activities. Where a work stoppage is required, construction activities shall not continue until adequate measures are in place to ensure stability of adjacent structures, excavation support, or utilities. Where movements in excess of the Review Level are detected the frequency of data collection shall be increased to once daily, or as directed by the Department, Department's Professionals, and all other agencies having jurisdiction. The criteria provided shall not relieve the Contractor of any responsibility with respect to damage incurred by any structures or utilities.

1. Vibration Monitoring: Peak particle velocities

   a. Review Level: 1.0-inches per second for all buildings, and other structures

   b. Limit Level: 2.0-inch per second for all buildings, and other structures

2. Crack Gauge Monitoring: Cumulative movement in any direction

   a. Review Level – 1/16 inch in any direction

   b. Limit Level – 1/8 inch in any direction

3. Survey Monitoring - Review Level:

   a. Buildings and other structures
      i. Vertical movement: 1/4 inch total movement, or 1/8 inch between two consecutive readings

      ii. Horizontal movement: 1/4 inch total movement, or 1/8 inch between two consecutive readings

      iii. Angular Distortion: 1/500

   b. Support of Excavation
      i. In accordance with the designers requirements.

4. Survey Monitoring - Limit Level:

   a. Buildings and Other Structures

i. Vertical movement: 3/8 inch total movement, or 3/16 inch between two consecutive readings

ii. Horizontal movement: 3/8 inch total movement, or 3/16 inch between two consecutive readings

iii. Angular Distortion: 1/250

b. Support of Excavation
   i. In accordance with the designers requirements.

3.8 ACTION ITEMS

A. Any movement or vibration exceeding the criteria outlined in 3.7 above shall be reported immediately to the Department, Department's Professionals, and all other agencies having jurisdiction. Work in the immediate area shall be suspended, unless directed otherwise by the Department's Professionals or any agency having jurisdiction. Corrective measures to ensure integrity and stability of adjacent structures shall be the responsibility of the Contractor.

B. In the event that a Review Level is reached the following shall be required:

1. The Department's Professionals and all other required governing agencies shall be immediately notified of the exceedance.

2. The exceedance shall be investigated to identify potential correlation to construction activities.

3. Contractor shall meet with the Department, Department's Professionals, and all other agencies having jurisdiction to discuss the need for a response to mitigate the potential for readings exceeding the Review Level.

4. Where required, submit a detailed plan of action to mitigate the potential for additional movement or vibration.

5. Install additional instruments as required to evaluate the need for any action necessary to prevent reaching the Limit Level.

C. In the event that a Limit Level is reached the following shall be required:

1. The Department's Professional and all other required governing agencies shall be immediately notified of the exceedance.

2. The exceedance shall be investigated to identify potential correlation to construction activities.

3. Construction shall be suspended and the structures shall be inspected by the Department, Department's Professionals, the Contractor's Engineer, and any governing agencies.

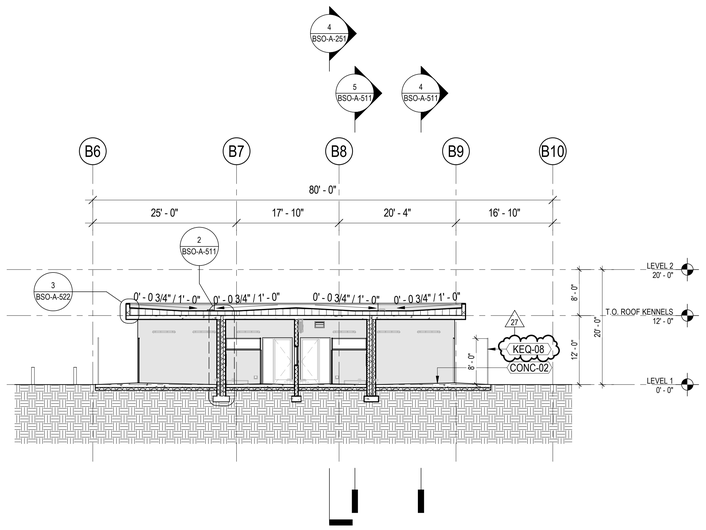
4. The Contractor shall take all actions necessary to protect structures and utilities and maintain integrity and stability of said structures and utilities. The Contractor shall be solely responsible for providing all necessary services in

conjunction with developing and applying remedial measures including any required engineering design.

D. Should vibration levels exceed the Limit Level, construction activities shall be suspended. The adjacent structures shall be visually inspected, and construction methods modified as necessary to maintain vibrations within acceptable levels.

E. Corrective actions requiring repair to any structure shall be the sole responsibility of the Contractor. Repairs shall be at no cost to the Department.

END OF SECTION



3 BUILDING SECTION 6

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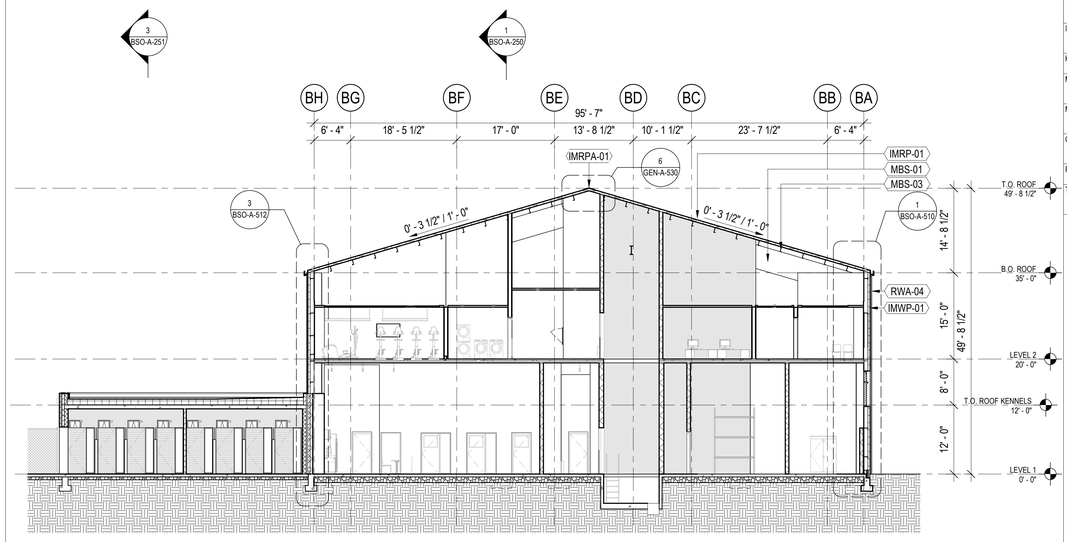

4 BUILDING SECTION 5

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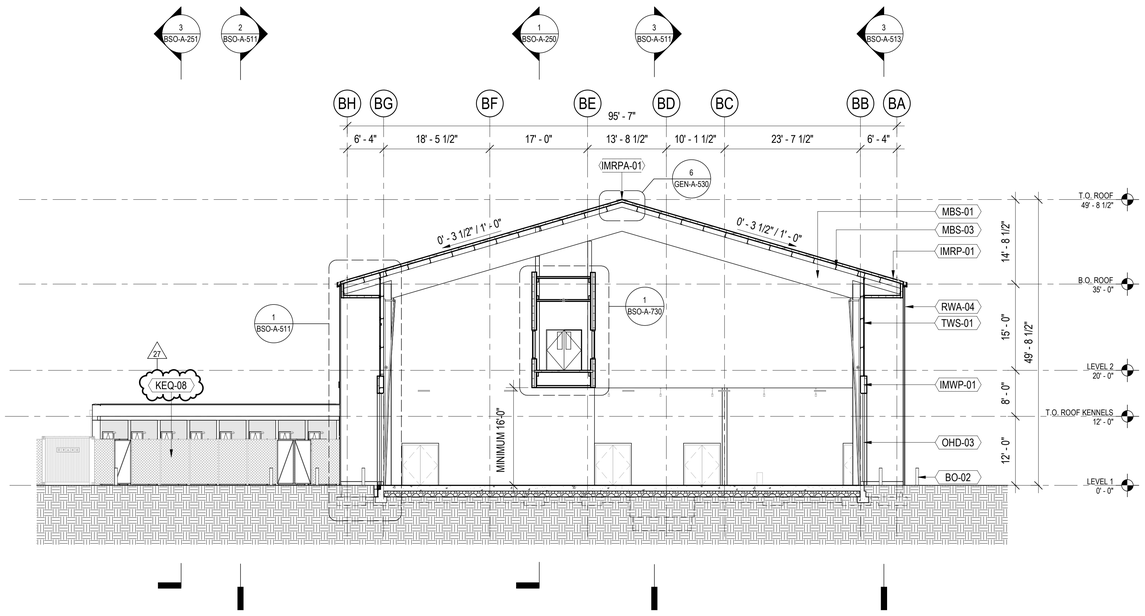

1 BUILDING SECTION 4

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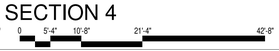


KEYNOTES

BO-02	055000 BOLLARD
CONC-02	033000 FINE HAIR BROOMED FINISH
IMRP-01	074113 4" INSULATED METAL ROOF PANELS - DARK GRAY
IMRPA-01	074113 MANUFACTURER'S OUTSIDE RIDGE FLASHING (FINISH TO MATCH ROOF PANELS)
IMWP-01	074213 4" INSULATED METAL WALL PANELS - DARK GRAY
KEQ-08	131900 KENNEL OUTDOOR FENCE
MBS-01	133419 PRIMARY STRUCTURAL FRAMING (BY PEMB FABRICATOR / INSTALLER
MBS-03	133419 Z-GIRT ROOF PURLINS (10") (BY PEMB FABRICATOR / INSTALLER)
OHD-03	083300 HIGH-LIFT TRACK SECTIONAL GARAGE DOOR
RWA-04	077000 3" X 4 1/2" SHEET METAL DOWNSPOUT
TWS-01	084500 INTERCONNECTING POLYCARBONATE WALL SYSTEM

TACTICAL TRAINING DESIGN

Tactical Design North
231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT

Jacobs Wyper Architects
1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER

Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, NY 10007

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

A & J Consulting Engineering Services, P.C.
164 Brighton Rd, Clifton, NJ 07012

MECHANICAL, AVIT ENGINEER

Interface Engineering, Inc.
2000 M Street NW, Suite 270, Washington, DC 20036

ACOUSTICAL ENGINEER

Cerami
1001 Ave of the Americas, 4th Floor, New York, NY 10018

CODE CONSULTING

CCI
215 W 40th St, 10th Floor, New York, NY 10018

CIVIL ENGINEER

Langan
1818 Market St #3300, Philadelphia, PA 19103

VERTICAL TRANSPORT

Michael Blades & Associates Ltd.
5409 Rapidan Ct, Lothian, MD 20711

SIGNAGE CONSULTANT

Patricia Hord Graphik Design
119 S. St. Asaph St, Alexandria, VA 22314

LANDSCAPE

Lee and Associates, Inc.
638 I Street NW, Washington, DC 20001

LIGHTING

MCLA
1000 Patomac St NW, Suite 121, Washington, DC 20007

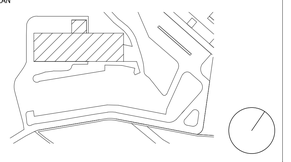
FOOD SERVICE

Hopkins Foodservice Specialists, Inc.
7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

COST ESTIMATING

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
27	16 JUN 2023	ADDENDUM # 27			
1	19 MAY 2023	ISSUED FOR BID			

RECORD REVISIONS

REGISTERED ARCHITECT
COMMONWEALTH OF PENNSYLVANIA
ENC. NO.

SIGNATURE DATE

ARCHITECT

SOM
Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

VERIFY SCALE

BAR IS ONE (1) INCH LONG
ON ORIGINAL DRAWING:
0 1

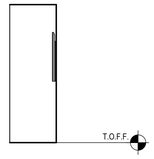
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

BUILDING SECTIONS

SHEET No.
BSO-A-251

DRAWN BY	CHECKED BY	DATE	SCALE
TDN	TDN	JUN 2023	AS NOTED



9 CLASSROOM W/ KITCHENETTE - EAST 2
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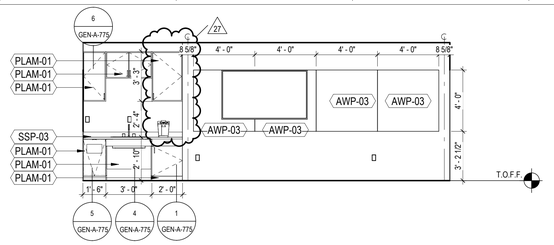

3 CLASSROOM W/ KITCHENETTE - EAST
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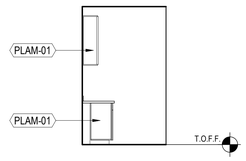

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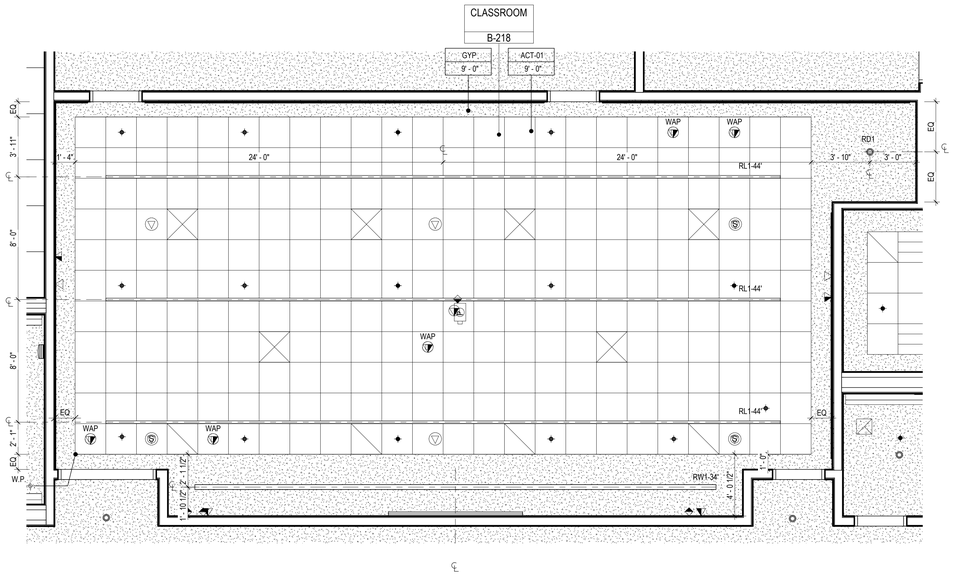

2 RCP - CLASSROOM W/ KITCHENETTE
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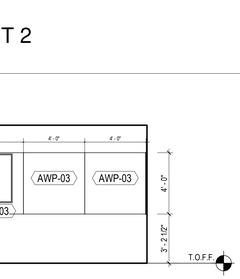

6 CLASSROOM W/ KITCHENETTE - WEST
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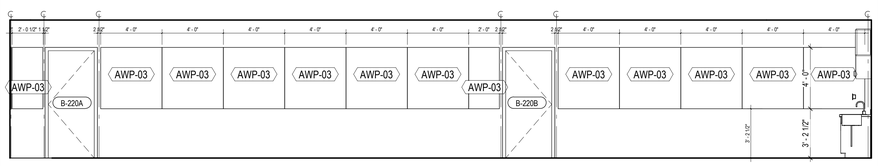
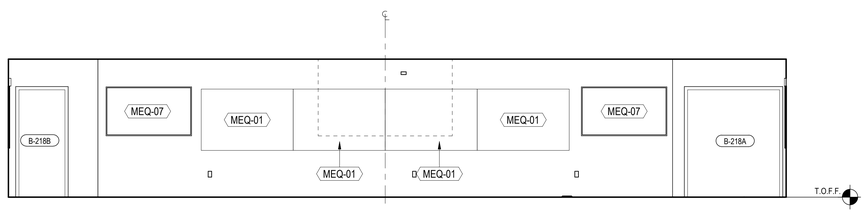
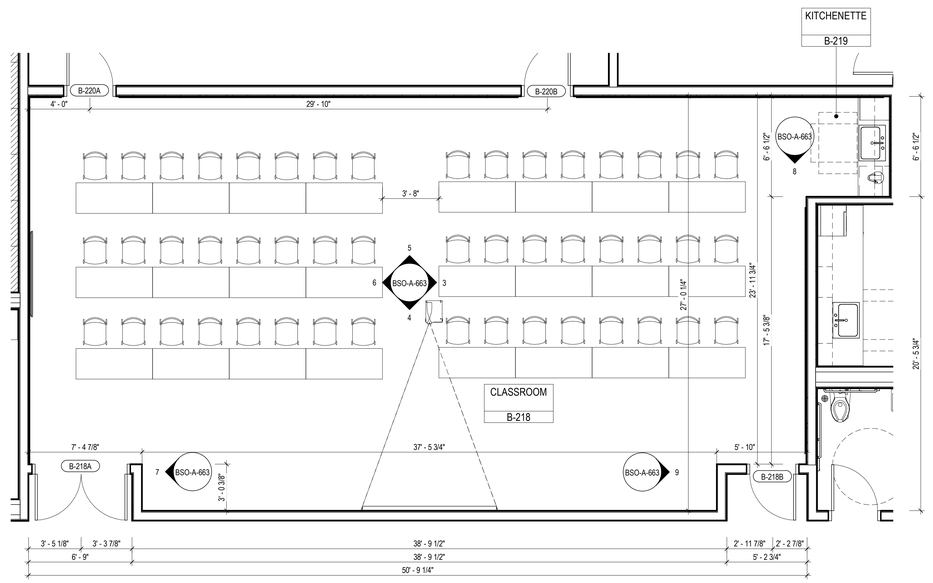


5 CLASSROOM W/ KITCHENETTE - NORTH
SCALE: 1/4" = 1'-0"



4 CLASSROOM W/ KITCHENETTE - SOUTH
SCALE: 1/4" = 1'-0"



1 PLAN - CLASSROOM W/ KITCHENETTE
SCALE: 1/4" = 1'-0"

KEYNOTES

AWP-03	097723 ACOUSTIC WALL PANEL, HIGH IMPACT
MEQ-01	117710 WHITE BOARD
PLAM-01	064000 PLASTIC LAMINATE, WHITE

LEGEND

FIRE RATINGS

- 1/2 HOUR FIRE RATING
- 1 HOUR FIRE RATING
- 2 HOUR FIRE RATING
- 3 HOUR FIRE RATING

XX DRAWING NOTE

1	SWITCH	SINGLE 1A	DOUBLE 1B	QUAD 1C	CONTROL PANEL 1D
2	ELECTRICAL OUTLET	SINGLE 2A	DUPLEX 2B	QUAD 2C	
3	DATA OUTLET	2 PORT 3A	6 PORT 3B	AV 3C	
4	FIRE ALRAM STROBE	4			
5	THERMOSTAT	5			
6	WALL CLOCK	BE-3B 6			
7	PULL STATION	7			
8	SECURITY CAMERA	8			
9	CARD READER	9			
10	ADA PUSH BOTTON	10			
11	FLOOR BOX	11A	FLR FLOOR MOUNTED 11B	DET FLOOR MOUNTED 11C	DEV FLOOR MOUNTED 11D
12	WAP	12			

RCP LEGEND

- CONCEAL PENDANT SPRINKLER
- PENDANT SPRINKLER
- UPRIGHT SPRINKLER
- SIDE WALL SPRINKLER
- LINEAR DIFFUSER
- DIFFUSER
- EXHAUST
- ACCESS PANEL
- XX1 LIGHT FIXTURE
- XX1 LIGHT FIXTURE
- (P) PROJECTOR
- PROJECTOR SCREEN
- EXIT SIGN
- (S) SPEAKER
- (PA) PAGING SPEAKER
- (M) MICROPHONE
- (S) SMOKE DETECTOR
- FIRE ALARM SPEAKER/STROBE
- FIRE ALARM STROBE
- (OS) OCCUPANCY SENSOR
- (VS) VACANCY
- (DS) DAYLIGHT SENSOR
- (180) SECURITY CAMERA
- WAP WAP ABOVE CEILING
- WAP WAP BELOW CEILING
- WOOD BAFFLE
- WALL CLOCK

GENERAL NOTES

1. ALL DIFFUSERS, REGISTERS AND GRILLES ARE BY THE .2 HVAC CONTRACTOR AND ARE SHOWN FOR LOCATION AND COORDINATION ONLY, UNO.
2. ALL PLUMBING FIXTURES, SPRINKLERS, FHCS, AND STANDPIPES AND RELATED EQUIPMENT ARE BY THE .4 PLUMBING CONTRACTOR AND ARE SHOWN FOR LOCATION AND COORDINATION ONLY, UNO.
3. ALL RECEPTACLES, LIGHTS SWITCHES, TELE/DATA RECEPTACLES, TELECOM EQUIPMENT AND AV EQUIPMENT ARE BY THE .4 ELECTRICAL CONTRACTOR AND ARE SHOWN FOR LOCATION AND COORDINATION ONLY, UNO.
4. REFERENCE GEN-G-103 FOR STANDARD MOUNTING HEIGHTS AND DETAILS
5. REFERENCE ALSO POWER, COMMUNICATIONS AND FINISH PLANS AND GEN-G-103 FOR STANDARD DEVICE MOUNTING ARRANGEMENTS, ALIGNMENTS AND DIMENSIONAL INFORMATION.
6. ALIGN WALL TILE JOINTS TO FLOOR TILE JOIN LINES.
7. CONFIRM FINAL TILE JOINT LAYOUT WITH PROFESSIONAL PRIOR TO INSTALLATION.
8. 5% OF LOCKERS SHALL BE ACCESSIBLE

DRAWING NOTES

VERIFY SCALE

BAR IS ONE (1) INCH LONG
ON ORIGINAL DRAWING:
0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

TACTICAL TRAINING DESIGN
Tactical Design North
231 E. Buffalo St #502, Milwaukee, WI 53202

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Jacobs Wyper Architects
1232 Chancellor St, Philadelphia, PA 19107

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250 Greenwich St, New York, NY 10007

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164 Brighton Rd, Clifton, NJ 07012

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2000 M Street NW, Suite 270, Washington, DC 20036

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1001 Ave of the Americas, 4th Floor, New York, NY 10018

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CCI
215 W 40th St, 10th Floor, New York, NY 10018

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5409 Rapidan Ct, Lothian, MD 20711

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119 S. St. Asaph St, Alexandria, VA 22314

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FOOD SERVICE
Hopkins Foodservice Specialists, Inc.
7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

COST ESTIMATING
AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEYPLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
27	16 JUN 2023	ADDENDUM # 27			
1	19 MAY 2023	ISSUED FOR BID			

RECORD REVISIONS

REGISTERED ARCHITECT COMMONWEALTH OF PENNSYLVANIA

SIGNATURE DATE

ARCHITECT
SOM
Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

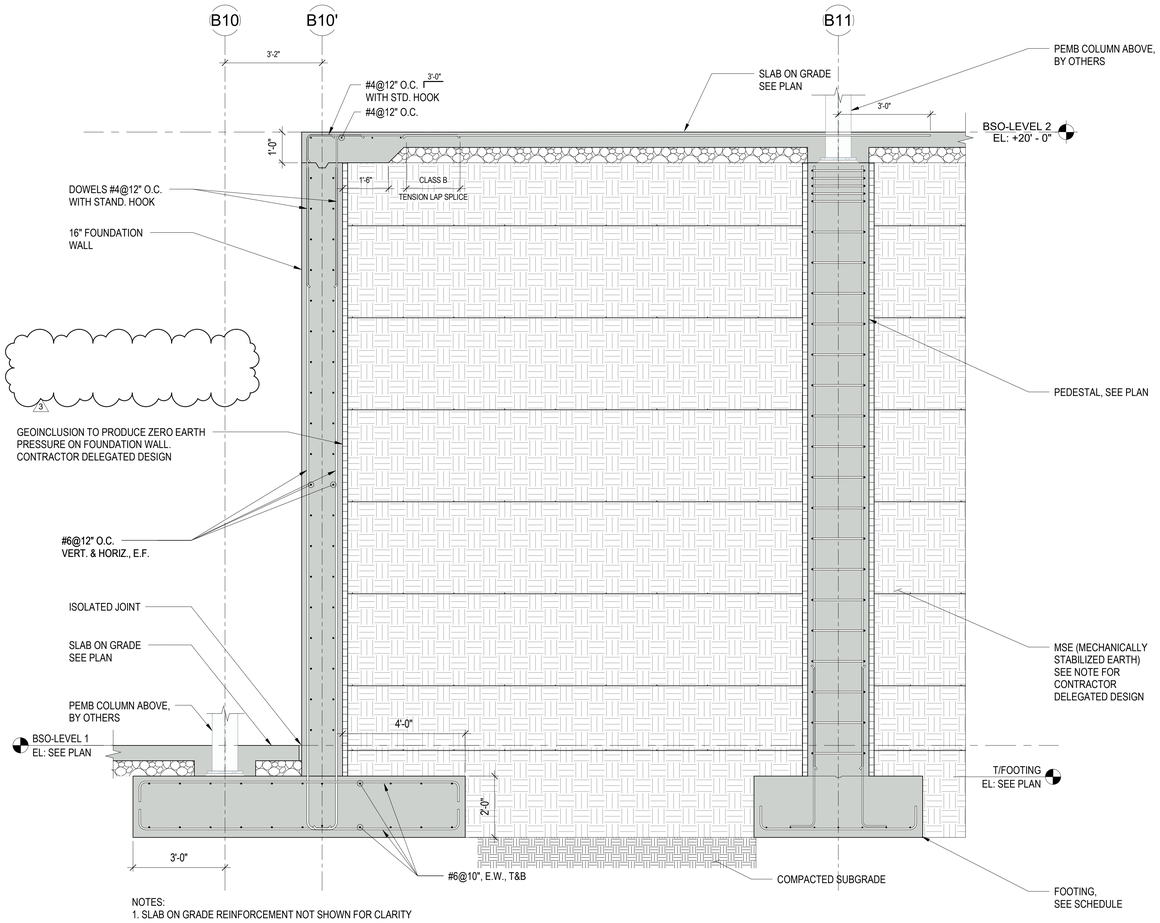
Pennsylvania State Police Academy
Core Buildings, BESO & Sitework

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

INTERIOR PLANS / RCP AND ELEVATIONS - CLASSROOM

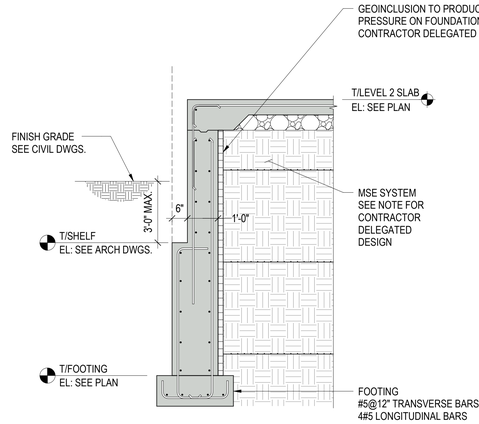
SHEET No. BSO-A-663

DRAWN BY	CHECKED BY	DATE	SCALE
TDN	TDN	JUN 2023	AS NOTED



NOTES:
1. SLAB ON GRADE REINFORCEMENT NOT SHOWN FOR CLARITY

1 SECTION
1/2" = 1'-0"
BSO-S-101 1



2 FOUNDATION WALL SECTION
1/2" = 1'-0"
BSO-S-101 1

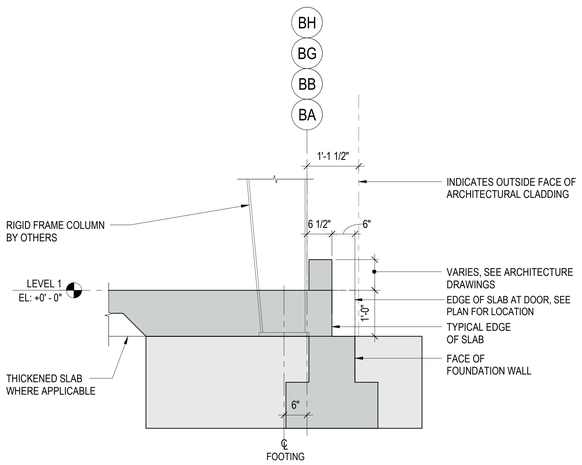
CONTRACTOR DELEGATED DESIGN:
MECHANICALLY STABILIZED EARTH RETAINING SYSTEM

NOTES: (RECEIVED FROM LANGAN 4/14/2022)
1. PRIOR TO CONSTRUCTION, CONTRACTOR TO SUBMIT MSE WALL CALCULATIONS AND DRAWINGS SIGNED AND STAMPED BY A PE LICENSED IN STATE OF PENNSYLVANIA FOR APPROVAL BY THE DEPARTMENT AND TOWNSHIP.

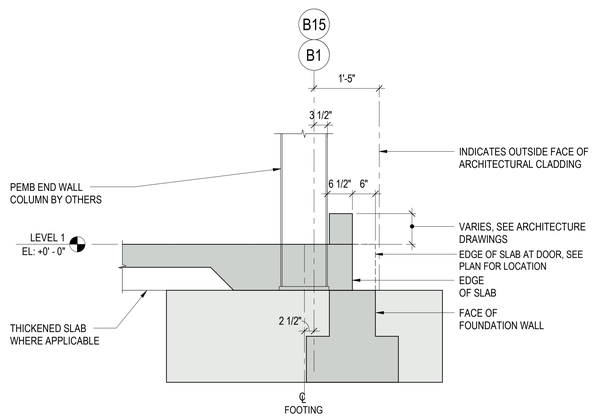
2. MSE WALL DESIGN MUST INCLUDE A SURCHARGE OF SUPER IMPOSED LOAD AND LIVE LOAD SHOWN IN THE LOADING DIAGRAM ON BSO-S-021 AND BE ABLE TO SUPPORT THE SLAB ABOVE AS A SLAB-ON-GRADE.

3. CONTRACTOR TO DESIGN AND PROVIDE COMPRESSIBLE "GEOINCLUSION" CONSISTING OF ELASTICIZED EPS GEOFOAM OR SIMILAR APPROVED PRODUCT TO BE COMPATIBLE WITH MSE WALL TO PRODUCE ZERO EARTH PRESSURE ON THE FOUNDATION WALL.

4. MSE WALL TO BE DESIGNED AS A PERMANENT STRUCTURE WITH A MINIMUM DESIGN LIFE OF AT LEAST 75 YEARS.



3 TYPICAL PERIMETER DETAIL AT FRAME COLUMNS
3/4" = 1'-0"



4 TYPICAL PERIMETER DETAIL AT END WALL COLUMNS
3/4" = 1'-0"

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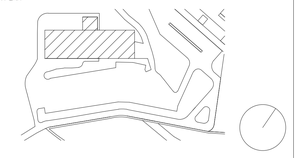
KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	16 JUN 2023	ADDENDUM 27			
2	19 MAY 2023	ISSUED FOR BID			
1	28 JAN 2022	ISSUED TO L&I			

RECORD REVISIONS

COMMONWEALTH OF PENNSYLVANIA
PROFESSIONAL
BONGHWAN KIM
ENGINEER
No. PE087243
PENNSYLVANIA

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D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
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FOUNDATION SECTIONS

SHEET No.
BSO-S-201

DRAWN BY	CHECKED BY	DATE	SCALE
Author	Checker		AS NOTED

PROJECT:		MAIN BUILDING- PENNSYLVANIA STATE POLICE ACADEMY 175 HERSHEY PARK DRIVE, HERSHEY PA 17033
	COUNTY:	DAUPHIN
	MUNICIPALITY	DERRY TOWNSHIP
CODE ENFORCEMENT ATHORITY:		LABOR & INDUSTRY
DGS PROJECT #		C-0211-0005 PHASE 5
APPLICABLE CODES:		PENNSYLVANIA UNIFORM CONSTRUCITON CODE CONSISTING OF THE FOLLOWING: 2015 INTERNATION BUIDLING CODE CHAPTER 11 IBC 2018 ACCESSIBILITY REQUIREMENTS 2015 INTERNATIONAL ENERGY CONSERVATION CODE 2015 INTERNATIONAL FIRE CODE 2015 INTERNATION FUEL GAS CODE 2009 INTERNATIONAL PERFORMANCE CODE FOR BUIDLINGS AND FACILITIES 2015 INTERNATIONAL PLUMBING CODE
PROJECT DESCRIPTION		NEW 5 STORY ACADEMIC, ADMINISTRATIVE AND RESIDENTIAL BUILDING FOR THE PENNSYLVANIA STATE POLICE ACADEMY. REPLACES THE ORIGINAL 1960 ACADEMY BUIDLING WITH SIMILAR FUNCTIONS WITH THE ADDITION OF AN INDOOR TRAINING VILLAGE.

2015 IBC BUILDING CODE REVIEW

CHAPTER 3: OCCUPANCY AND USE GROUP CLASSIFCATIONS

	PRIMARY BUILDING USE GROUP:	A-3
	ADDITIONAL USE GROUPS:	A-2, B, R-2, S-1, S-2
	MOST RESTRICTIVE PROPOSED USE GROUPS:	A-3
	MIXED OCCUPANCY	YES
	OCCUPANCY SEPARATION	NON-SEPARATED; SECTION 510.2 3HR SEPARATION BETWEEN LEVELS 1 & 2.

CHAPTER 4: SPECIAL DETAILED REQUIREMENTS BASED ON OCCUPANCY

	COVERED MALL - 402		HIGH-RISE BUILDING - 403		ATRIUM - 404
	UNDERGROUND BUILDING - 405		MOTOR VEHICLE - 406		GROUP I2 - 407
	GROUP I3 - 408		MOTION PICT PROJECTION RM - 409		STAGES & PLATFORMS - 410
	SPECIAL AMUSEMENT - 411		AIRCRAFT RELATED - 412		COMBUSTIBLE STORAGE - 413
	HAZARDOUS MATERIALS - 414		GROUPS H1, H2, H3, H4, H5 - 415		APPLICATION OF PLAMMABLE FINISHES - 416
	DRYING ROOMS - 417		ORGANIC COATINGS - 418		LIVE/ WORK UNITS - 419
X	GROUPS I1, R1, R2, R3 - 420		HYDROGEN CUTOFF ROOMS - 421		AMBULATORY CARE - 422
	STORM SHELTERS - 423		CHILDRENS PLAY STRUCTS - 424		COMBUSTIBLE DUST, GRAIN PROCESSING/ STORAGE - 426
SPRINKLER PROTECTION			NONE	X	NFPA

CHAPTER 5: CONSTRUCTION TYPE & HEGHT AND AREA LIMITATIONS - TABLE 503

USE GROUP		CONSTRUCTION TYPE				TYPE IIIA 3 IIIA 2					
	SEPARATED	TYPE IA									
X	NON SEPARATED	HEIGHT		AREA		HEIGHT		AREA			
MOST RESTRICTIVE USE GROUP		FT	STORIES			FT	STORIES				
A-2		UL	UL	UL							
R-2						85	12	48,000			
504.2	HEIGHT INCREASE - SPRINKLER										
506	AREA MODIFICATIONS						I	P	F	W	
506.2	FRONTAGE INCREASE		11159			FI	0.697456...	2398	2272	30	
TOTAL AREA INCREASE PERMITTED				59,159	SF	TI					
MAX. PERMITTED HEIGHT & AREA- IA			UL		UL						
PROPOSED HEIGHT & AREA - IA			33' - 6"		202,884						
MAX. PERMITTED HEIGHT & AREA IIIA 3			37' - 4"		177,478						
PROPOSED HEIGHT & AREA IIIA 3			37'-4"		162,552						

INCIDENTAL ACCESSORY USES - TABLE 509

ROOM OR AREA			SEPARATION AND/ OR PROTECTION				
FURNACE ROOM > 400,000 BTUH							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
BOILER > 15PSI & 10 HP							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
REFRIGERANT MACHINERY							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
HYDROGEN CUTOFF							
	APPLICABLE	X	NOT APPLICABLE	1 HR	B,F,M,S & U	2HR	A,E,I & R
INCINERATOR ROOMS			2HRS AND AUTOMATIC SPRINKLER SYSTEM				
PAINT SHOPS NOT H, IN OCC NOT F.							
	APPLICABLE	X	NOT APPLICABLE	2 HR	OR		1 HR AND AUTOMATIC SPRINKLER...
LAB & VOCATIONAL NOT H IN E							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
LAB NOT H IN I-2							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
LAB NOT H IN AMBULATORY CARE							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
LAUNDRY ROOMS > 100 SF							
X	APPLICABLE		NOT APPLICABLE	1 HR	OR	X	AUTOMATIC FIRE EXTINGUISHING...
LAUNDRY ROOMS > 100 SF IN I-2							
	APPLICABLE	X	NOT APPLICABLE	1 HR			
GROUP I3 CELLS OR I-2 W/PADDED CELLS OR PATIENT ROOMS							
	APPLICABLE	X	NOT APPLICABLE	1 HR			
AMBULATORY CARE OR GROUP I2 WASTE/ LINEN COLLECTION W/ CONTAINERS > 10 CUBIC FT							
	APPLICABLE	X	NOT APPLICABLE	1 HR			
ALL OTHER OCCUPANCIES, WASTE/ LINEN OVER 100 SF							
	APPLICABLE	X	NOT APPLICABLE	1 HR	OR		AUTOMATIC FIRE EXTINGUISHING...
AMBULATORY CARE OR GROUP I2 STORAGE > 100 SF							
	APPLICABLE	X	NOT APPLICABLE	1 HR			
STATIONARY BATTERY STORAGE							
	APPLICABLE	X	NOT APPLICABLE	1 HR IN B,F,M,S & U		2HR IN A,E,I & E	
SEPARATED OCCUPANCY - 508.4			APPLICABLE	X	NOT APPLICABLE		

510 SPECIAL PROVISIONS

510.2 HORIZONTAL BUIDLING SEPARATION ALLOWANCE

HORIZONTAL ASSEMBLY RATING:	3HR	REQUIRED	3HR	PROVIDED
PODIUM CONSTRUCTION TYPE:	IA	REQUIRED	IA	PROVIDED
TOWER CONSTRUCTION TYPE:	IIIA	PERMITTED	IIIA	PROVIDED
SHAFT, STAIR & RAMP ENCLOSURES	2HR	REQUIRED	2HR	PROVIDED
PODIUM FULLY SPRINKLERED	X	REQUIRED	X	PROVIDED
SMALLER ALLOWABLE MAX HEIGHT	85FT	REQUIRED	34FT	PROVIDED

CHAPTER 6: CONSTRUCTION TYPE - TABLE...	**CONSTRUCTION TYPE**	**TYPE XXX**
BUILDING ELEMENT	REQUIRED FIRE RESISTANCE RATING	
PRIMARY STRUCTURAL FRAME	3 HR TYPE IA	1 HR TYPE IIIA
BEARING WALLS - EXTERIOR	3 HR TYPE IA	2 HR TYPE IIIA
BEARING WALLS - INTERIOR	3 HR TYPE IA	1 HR TYPE IIIA
NONBEARING WALLS AND PARTITIONS - EXTERIOR	TABLE 602 BELOW	
NONBEARING WALLS AND PARTITIONS ...	0 HR TYPE 1A	0 HR TYPE IIIA
FLOOR CONSTRUCTION & SECONDARY...	2 HR TYPE 1A	1 HR TYPE IIIA
ROOF CONSTRUCTION & SECONDARY...	1-1/... TYPE 1A	1 HR TYPE IIIA

TABLE 602 REQUIREMENTS

FIRE SEPARATION DISTANCE	CONSTRUCTION TYPE	OCCUPANCY	FIRE RESISTANCE RATING				
LESS THAN 5 FT	TYPE IA	A-3	1 HR		APPLICABLE	X	NOT APPLICABLE
5FT LESS THAN 10 FT			1 HR		APPLICABLE	X	NOT APPLICABLE
10FT LESS THAN 30FT			1 HR		APPLICABLE	X	NOT APPLICABLE
30FT OR MORE			0 HR	X	APPLICABLE		NOT APPLICABLE
LESS THAN 5 FT	TYPE IIIA	R-2	1 HR		APPLICABLE	X	NOT APPLICABLE
5FT LESS THAN 10 FT			1 HR		APPLICABLE	X	NOT APPLICABLE
10FT LESS THAN 30FT			1 HR		APPLICABLE	X	NOT APPLICABLE
30FT OR MORE			0 HR	X	APPLICABLE		NOT APPLICABLE

CHAPTER 7: FIRE & SMOKE PROTECTION FEATURES

TABLE 705.8 REQUIREMENTS	PROPOSED MINIMUM FIRE SEPARATION...					
SPRINKLER PROTECTION	NONE	X	NFPA 13			
FIRE SEPARATION DISTANCE					DEGREE OF OPENING PROTECTION	ALLOWABLE AREA
LESS THAN 3FT	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	NOT PERMITTED
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	NOT PERMITTED
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	NOT PERMITTED
3 LESS THAN 5	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	NOT PERMITTED
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	15%
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	15%
5 LESS THAN 10	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	10%
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	25%
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	25%
10 LESS THAN 15	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	15%
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	45%
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	45%
15 LESS THAN 20	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	25%
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	75%
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	75%
20 LESS THAN 25	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	45%
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	NO LIMIT
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	NO LIMIT
25 LESS THAN 30	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	70%
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	NO LIMIT
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	NO LIMIT
30 OR GREATER	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - NS	NO LIMIT
	APPLICABLE	X	NOT APPLICABLE		UNPROTECTED - S	NO LIMIT
	APPLICABLE	X	NOT APPLICABLE		PROTECTED	NO LIMIT

CHAPTER 7: FIRE & SMOKE PROTECTION FEATURES

ITEM	REFERENCE SECTION					
SHAFT ENCLOSURES	SECTION 712					RATING
ESCALATOR IN SPRIKLERED BLDG	712.1.3		APPLICABLE	X	NOT APPLICABLE	
NON-EXIT STAIR, SPRINKLERED...			APPLICABLE		NOT APPLICABLE	
MIN. RATING 4 OR MORE STORIES	713.4	X	APPLICABLE		NOT APPLICABLE	2 HR
MIN. RATING < 4 STORIES	713.4		APPLICABLE	X	NOT APPLICABLE	1 HR
REFUSE/ LAUNDRY CHUTES	713		APPLICABLE	X	NOT APPLICABLE	
ELEVATOR/ DUMBWAITER SHAFT	713		APPLICABLE	X	NOT APPLICABLE	2 HR
HOISTWAY PROTECTION - NON-HIGH RISE	3006.2		APPLICABLE	X	NOT APPLICABLE	FULLY SPKLR
EXIT ENCLOSURE	711, 1023.2					
MIN. RATING 4 OR MORE STORIES	711, 1023.2	X	APPLICABLE		NOT APPLICABLE	2 HR
MIN. RATING < 4 STORIES	711, 1023.2		APPLICABLE	X	NOT APPLICABLE	1 HR
ITEM	REFERENCE SECTION					
FIRE PARTITIONS	SECTION 708					RATING
CORRIDOR WALLS	708, 1020.1	X	APPLICABLE		NOT APPLICABLE	
TABLE 1020.1	SEE CHAPTER 10 ANALYSIS BELOW					
OPENING PROTECTIVES	SECTION 716					RATING
FIRE DOOR & SHUTTER						
FIRE WALLS & BARRIERS > 1HR	TABLE 716.5 3HR WALL		APPLICABLE		NOT APPLICABLE	3 HR
ENCLOSURES FOR SHAFTS, INTERIOR EXIT STAIRWAYS AND INTERIOR EXIT RAMPS	716.5 2 HR SHAFT	X	APPLICABLE		NOT APPLICABLE	1-1/2 HR
FIRE PARTITIONS INCLUDING CORRIDOR WALLS	716.5 0.5 HR PARTITION	X	APPLICABLE		NOT APPLICABLE	1/3 HR
EXTERIOR WALLS	716.5		APPLICABLE	X	NOT APPLICABLE	

CHAPTER 8: INTERIOR FINISHES - TABLE 803.11

USE GROUP	INTERIOR EXIT STAIRS, RAMPS AND EXIT PASSAGEWAYS - FULLY SPRINKLERED	CORRIDORS AND ENCLOSURE FOR EXIT ACCESS STAIRWAYS AND RAMPS - FULLY SPRINKLERED	ROOMS AND ENCLOSED SPACES - FULLY SPRINKLERED
A-1 & A-2	B	B	C
A-3	B	B	C
B, E, M, R-1	B	C	C

CHAPTER 9: FIRE PROTECTION SYSTEMS

REFER TO FIRE PROTECTION DRAWINGS, FIRE ALARM DRAWINGS AND ELECTRICAL DRAWINGS

ITEM	REFERENCE SECTION			
FIRE EXTINGUISHERS	906.3 (1)			
ORDINARY (MODERATE) HAZARD OCCUPANCY	MINIMUM RATED SINGLE EXTINGUISHER	MAX FLOOR AREA PER UNIT A	MAX FLOOR AREA PER EXTINGUISHER	MAXIMUM TRAVEL DISTANCE TO FE
	2-A	1,500 SF	11,250 SF	75 FT

CHAPTER 10: MEANS OF EGRESS

REFERENCE FOLLOWING LIFE SAFETY PLANS AND TABLES						
ACCESSIBLE MEANS OF EGRESS	SECTION 1009					
REQUIRED ACC. MEANS OF...	SECTION 1009.1	X	APPLICABLE		NOT APPLICABLE	
ACC. ELEVATORS > 4 STORIES	SECTION 1009.2.1	X	APPLICABLE		NOT APPLICABLE	PROVIDED
ELEVATOR AREA OF REFUGE	SECTION 1009.4 EXCEPTION 2		APPLICABLE	X	NOT APPLICABLE	SPKLR THRU OUT
ACC. STAIRS MIN 48" W/ AREA OF REFUGE	SECTION 1009.3	X	APPLICABLE		NOT APPLICABLE	SEE BELOW
MIN 48" WIDTH	1009.3 EXCEPTION 2		APPLICABLE	X	NOT APPLICABLE	SPKLR THRU OUT
AREA OF REFUGE	1009.3 EXCEPTTION 4		APPLICABLE	X	NOT APPLICABLE	SPKLR THRU OUT
CORRIDORS	TABLE 1020.1					
RATING FOR SPRKLR. BLDG, A, B	SECTION 1020	0 HR	REQUIRED	0 HR	PROVIDED	OCC. > 30
RATING FOR SPRKLR. BLDG, R-1	SECTION 1020	.5 HR	REQUIRED	.5 HR	PROVIDED	OCC. > 10

2015 IECC REQUIREMENTS

COUNTY	DAUPHIN	CLIMATE ZONE	5A		
TABLE C402.1.3 REQUIREMENTS	ZONE 5 - ALL OTHERS				
ROOF - INSULATION ABOVE DECK					
INSULATION ABOVE DECK	R30 CI	REQUIRED	R30 CI	PROVIDED	
METAL BUILDINGS	R30 CI	REQUIRED	R30 CI	PROVIDED	
WALLS ABOVE GRADE					
MASS	R11.4 CI	REQUIRED	R20 CI	PROVIDED	
METAL BUILDING	R13 + R13 CI	REQUIRED	R20 CI	PROVIDED	
METAL FRAMED	R13 + R7.5CI	REQUIRED	R13 + R20 CI	PROVIDED	
WALLS BELOW GRADE					
MASS	R-7.5 CI	REQUIRED		PROVIDED	
SLAB ON GRADE					
UNHEATED	R10 FOR 24" BELOW	REQUIRED		PROVIDED	
HEATED	R15 FOR 36" BELOW	REQUIIRED		PROVIDED	
OPAQUE DOORS					
NONSWINGING	R4.75	REQUIRED		PROVIDED	

REFERENCE FOLLOWING ENERGY MODEL REPORT FOR FULL BUILDING PERFORMANCE

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING: 0 — 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

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TACTICAL TRAINING DESIGN

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7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN

Aqua Design International
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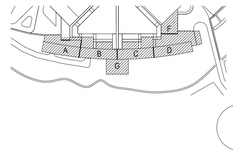
KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	16 JUN 2023	ADDENDUM 27			
2	19 MAY 2023	ISSUED FOR BID			
1	18 FEB 2022	ISSUED TO L&I			

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

GENERAL LIFE SAFETY TABLES

SHEET No.
MAQ-LS-001

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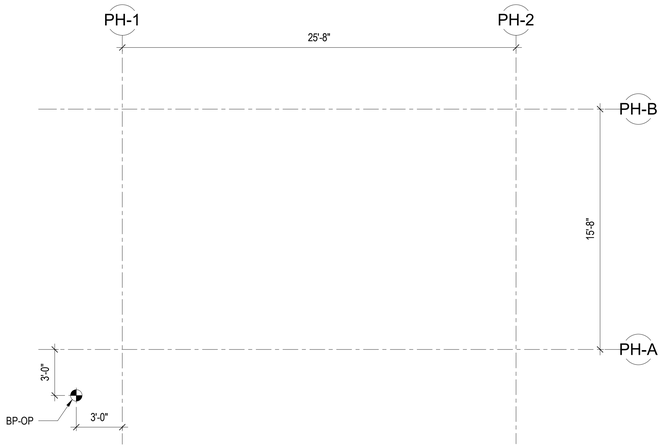
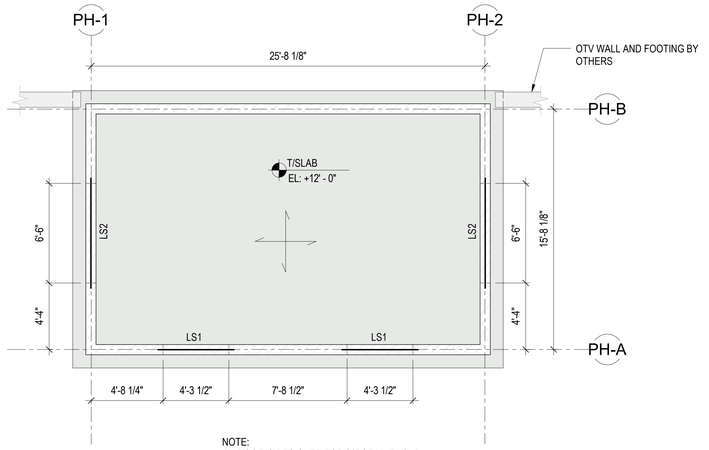
TNB	TNB	SEPT 2022	AS NOTED

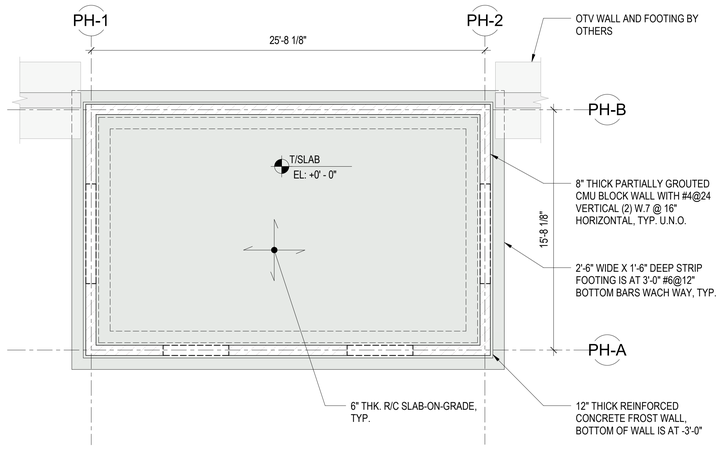


3 PUMP HOUSE GRID SETOUT PLAN
1/4" = 1'-0"



NOTE:
1. ROOF IS DESIGNED FOR 20PSF LIVE LOAD.
2. CMU WALLS ARE CENTERED ON GLRIDLINES, TYP. U.N.O.

2 PUMP HOUSE - T.O. ROOF
1/4" = 1'-0"



1 PUMP HOUSE - T/SLAB LEVEL 1
1/4" = 1'-0"

NOTES:
1. BUILDING ELEVATIONS ARE REFERENCED TO BUILDING REFERENCE DATUM.
   EL. +0' = NAVD 88 DATUM, SEE GEN-G-100
2. DATA FOR MASONRY: f'm = 1900 PSI.
3. SEE GEN-S-003 FOR SNOW, WIND, AND SEISMIC LOAD CRITERIA.
   DESIGN COEFFICIENT AND FACTORS FOR SEISMIC FORCE RESISTING SYSTEM:
   ORDINARY REINFORCED MASONRY WALLS
   R = 2 | Cd = 2 1/2 | OMEGA = 1 3/4
   SUPERIMPOSED DEAD LOADS:
   UNIFORM = 20 PSF TYPICAL, U.N.O.
   LIVE LOADS:
   UNIFORM = 125 PSF TYPICAL, 100 PSF ATTIC, 125 PSF ROOF, U.N.O.
4. SEE GEN-S-003 FOR FOUNDATION AND EXCAVATION NOTES.
5. SEE GEN-S-004 AND GEN-S-005 FOR CONCRETE AND STRUCTURAL STEEL AND METAL DECK NOTES.
6. WATERPROOFING MEMBRANE/ ADMIXTURE AND PLANT MADE WEEP HOLES SHALL BE PROVIDED AT ALL HOLLOW CORE LOCATIONS.
7. SEE ARCHITECTURAL DRAWINGS FOR DOOR AND WINDOW OPENINGS DIMENSION
8. SEE GEN-S-301 AND GEN-S-302 FOR FOOTING DETAILS. SEE OTV-COV-S-301 FOR FOOTING SCHEDULE.
9. SEE GEN-S-321 AND GEN-S-322 FOR SLAB ON GRADE DETAILS. SEE OTV-S-301 FOR SLAB-ON-GRADE SCHEDULE.
10. SEE GEN-S-420 FOR RC SLAB DETAILS AND SCHEDULE.
11. SEE GEN-S-421 FOR RC BEAM DETAILS AND SCHEDULE.
12. SEE GEN-S-501 AND GEN-S-502 FOR TYPICAL STRUCTURAL STEEL DETAILS.
13. SEE GEN-S-521 FOR METAL DECK SLAB DETAILS AND SCHEDULE.
14. SEE GEN-S-601 TO 603 FOR MASONRY DETAILS.
15. SEE DETAIL 01/C6-OTV-S-101 FOR DETAIL AT MASONRY PARAPET WALL.

SLAB-ON-GRADE REINFORCEMENT SCHEDULE

f'c = 4000 psi
fy = 60 ksi

BUILDING	T(in)	REINFORCEMENT		REMARKS
		TOP	BOTTOM	
OTV	6	12X12 - W7XW7		

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COST ESTIMATING
AECOM
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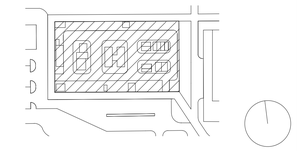
KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1	16 JUN 2023	ADDENDUM 27			

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COMMONWEALTH OF PENNSYLVANIA
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HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

PA State Police Academy - New Construction of Three Core Buildings and BESO

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

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FRAMING PLANS - LEVEL 1 AND 2

SHEET No. OTV-PH-S-101

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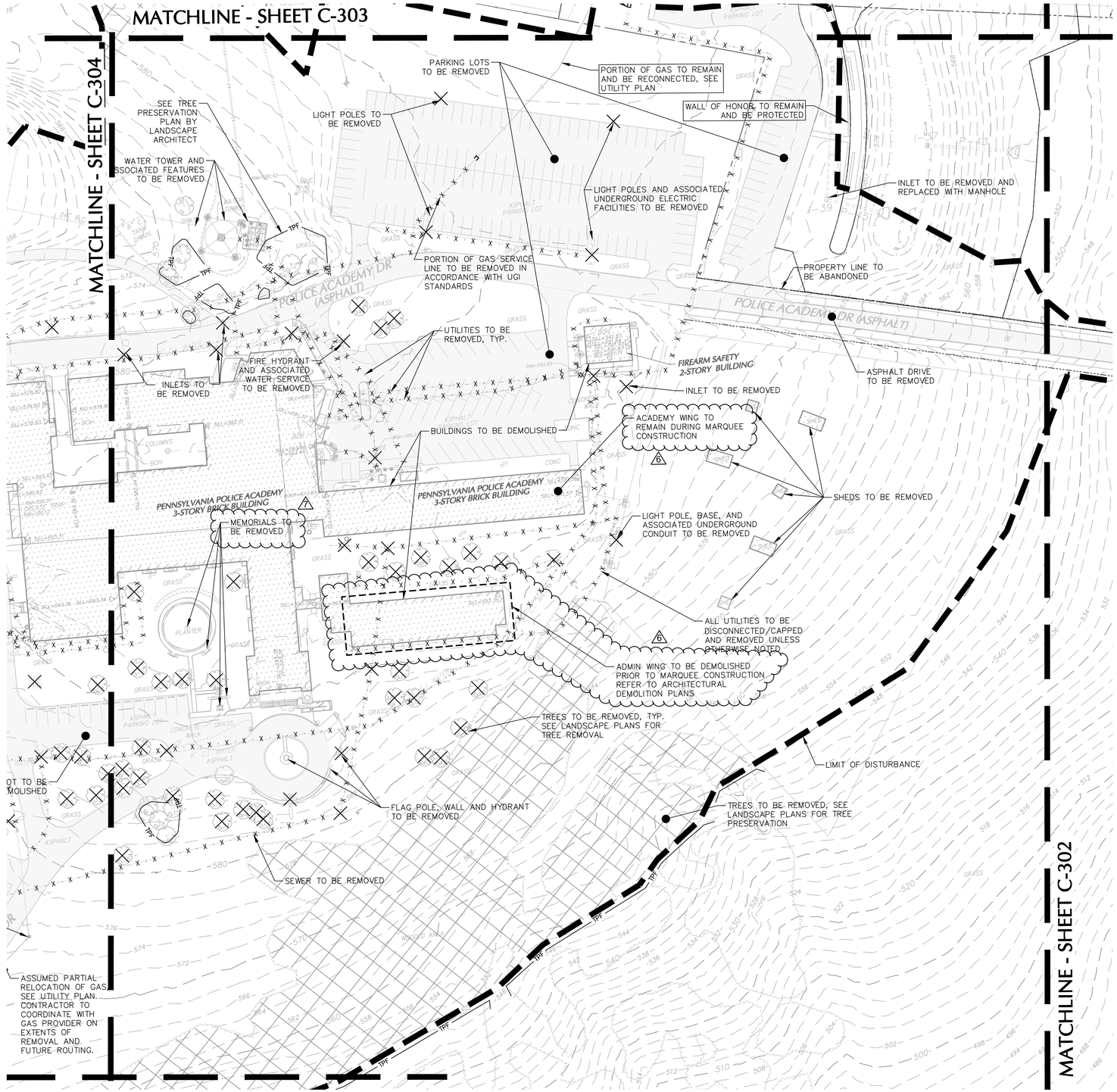

LEGEND (NOT SHOWN TO SCALE)

- AIR CONDITIONING UNIT
- BOLLARD
- COLUMN
- DOOR
- DOUBLE DOOR
- FLAG POLE
- MONITORING WELL
- SIGN
- TREE
- GROUND LIGHT
- CATCH BASIN
- CLEANOUT
- ELECTRIC BOX
- ELECTRIC METER
- FIRE HYDRANT
- COMMUNICATION BOX
- GAS METER
- GAS VALVE
- GUY WIRE
- LIGHT POLE
- MANHOLE (TYPE AS LABELED)
- POWER POLE
- ROOF DRAIN
- STANDPIPE
- TRAFFIC SIGNAL BOX
- PEDESTRIAN PUSH BUTTON
- TRAFFIC SIGNAL
- TRAFFIC SIGNAL ARM
- TRAFFIC SIGNAL POLE
- UNDERGROUND VAULT
- VALVE UNKNOWN
- WATER METER
- WATER VALVE
- METAL GUARD RAIL
- WOOD GUARD RAIL
- STOCKADE FENCE
- CHAINLINK FENCE
- IRON FENCE
- TREE LINE
- OVERHEAD WIRE
- EASEMENT LINE
- PROPERTY LINE
- PROPERTY LINE (TO BE ABANDONED)
- RIGHT-OF-WAY LINE
- CONTOUR LINE
- SANITARY FORCE MAIN
- CABLE TV MARK OUT LINE
- DRAINAGE MARK OUT LINE
- ELECTRIC MARK OUT LINE
- COMMUNICATION MARK OUT LINE
- GAS MARK OUT LINE
- SANITARY SEWER MARK OUT LINE
- WATER MARK OUT LINE
- UNKNOWN MARK OUT LINE
- REFERENCE UTILITY LINE (TYPE AS NOTED) – PLOTTED FROM EXISTING MAPPING
- BUILDING TO BE DEMOLISHED
- LIMIT OF DISTURBANCE
- ASPHALT TO BE REMOVED
- TREES TO BE REMOVED
- SITE FEATURE TO BE REMOVED
- UTILITY TO BE REMOVED
- TREE PROTECTION FENCE

TACTICAL TRAINING DESIGN	LOCAL ARCHITECT
Tactical Design North 231 E. Buffalo St #502, Milwaukee, WI 53202	**Jacobs Wyper Architects** 1232 Chancellor St, Philadelphia, PA 19107
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FOOD SERVICE	COST ESTIMATING
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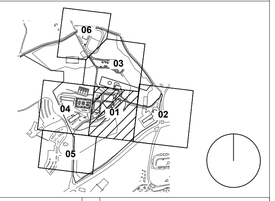
NOTE

KEYPLAN



4	29 JUL 2022 NPDES COMMENTS		
3	02 JUN 2022 TOWNSHIP COMMENTS	7	16 JUNE 2023 BID ADDENDUM 27
2	06 MAY 2022 TOWNSHIP COMMENTS	6	02 JUNE 2023 BID ADDENDUM 24
1	18 FEB 2022 ISSUED TO L&I	5	19 MAY 2023 ISSUED FOR BID

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2023-06-09

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HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

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SITE DEMOLITION PLAN - 1

SHEET No. STE-C-301

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TJM/BXP/KSB	KLF	MAY 2023	AS NOTED

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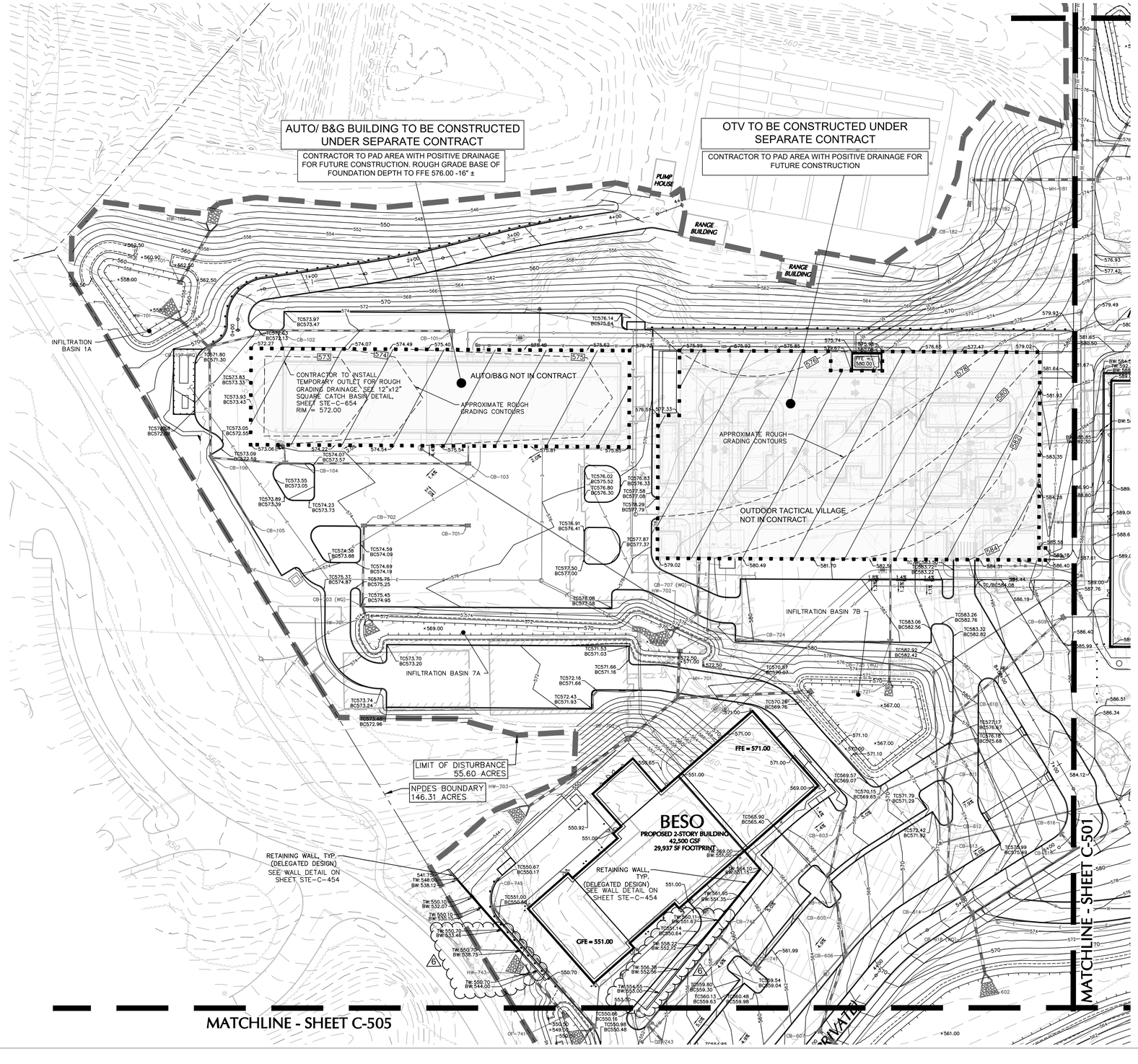

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SCALE: 1 INCH = 50 FEET

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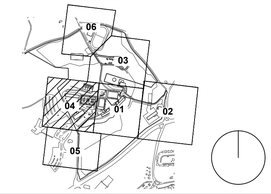
NOTE

KEYPLAN



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2023-06-16
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D.G.S. PROJECT No.
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Pennsylvania State Police Academy
Core Buildings, BESO & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

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GRADING PLAN - 4

SHEET No. STE-C-504

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Date: 6/15/2023 Time: 14:04 User: tmoyer Style Table: Langan.stb Layout: STE-C-504 - GRADING PLAN 4 Document Code: 220156303-0501-CG101-0105

Tree #	Common name	Scientific name	Diameter (in.)	Condition	Comments	Remove/Protect
1	Norway spruce	*Picea abies*	20.8	Good/Fair	Lawnmower damage, woodpeckers	Remove
2	Flowering dogwood	*Cornus florida*	16.3	Good/Fair	powdery mildew, dogwood borer	Remove
3	White oak	*Quercus alba*	20	Good	some major deadwood (d/w)	Remove
4	Black oak	*Quercus velutina*	23.2	Good	no issues	Remove
5	Pignut hickory	*Carya glabra*	14	Fair	tip dieback, anthracnose	Remove
6	Flowering dogwood	*Cornus florida*	9.4, 7	Fair	powdery mildew, dogwood borer	Remove
7	Black oak	*Quercus velutina*	33.5	Good/Fair	major d/w, lean toward road	Remove
8	Black oak	*Quercus velutina*	28.2	Fair	major d/w, significant wound at base	Remove
9	Black oak	*Quercus velutina*	19	Good/Fair	no issues	Remove
10	Pignut hickory	*Carya glabra*	22.5	Good	anthracnose	Remove
11	Norway maple	*Acer platanoides*	10	Fair	Crimson King, nylon twine, mowers	Remove
12	Mockernut hickory	*Carya tomentosa*	11.1	Fair	trunk wound, sealing over	Remove
13	Scarlet oak	*Quercus coccinea*	18.4	Good/Fair	minor deadwood	Remove
14	Mockernut hickory	*Carya tomentosa*	10.7	Good	no issues	Remove
15	Pignut hickory	*Carya glabra*	10	Good	no issues	Remove
16	Black oak	*Quercus velutina*	21.2	Good	no issues	Remove
17	Black oak	*Quercus velutina*	29.3	Fair	torsion crack along trunk	Remove
18	White oak	*Quercus alba*	30.5	Good	no issues	Protect
19	Black oak	*Quercus velutina*	15.5	Good/Fair	poor form	Remove
20	Black oak	*Quercus velutina*	21.7	Good	no issues	Remove
21	Black oak	*Quercus velutina*	17.5	Good	hanger in upper canopy	Remove
22	Mockernut hickory	*Carya tomentosa*	18.1	Good	no issues	Remove
23	Eastern white pine	*Pinus strobus*	11.4	Good/Fair	storm damage	Remove
24	Bitternut hickory	*Carya cordiformis*	26.2	Good	no issues	Protect
25	Shagbark hickory	*Carya ovata*	11.5	Fair	anthracnose	Protect
26	Southern red oak	*Quercus falcata*	17.4	Good/Fair	no issues	Protect
27	Northern red oak	*Quercus rubra*	22.2	Good	basal wounds	Protect
28	Black oak	*Quercus velutina*	30.5	Fair	Ganoderma?, lean, dead top, hazard	Remove
29	White oak	*Quercus alba*	11.8	Good	no issues	Protect
30	Red maple	*Acer rubrum*	19.7	Good/Fair	may also be Silver maple	Remove
31	Bitternut hickory	*Carya cordiformis*	17.4	Good/Exc.	no issues	Remove
32	Norway spruce	*Picea abies*	21.3	Good	some lawnmower damage	Remove
33	Black oak	*Quercus velutina*	33	Good	basal wounds	Remove
34	White oak	*Quercus alba*	35.5	Good	asymmetric crown	Remove
35	Scarlet oak	*Quercus coccinea*	25.2	Good/Fair	major deadwood	Remove
36	White oak	*Quercus alba*	26	Good	no issues	Remove
37	Northern red oak	*Quercus rubra*	30	Fair/Poor	sounds hollow, crack on back side	Remove
38	Black oak	*Quercus velutina*	23.4	Good	small torsion crack	Remove
39	Northern red oak	*Quercus rubra*	19	Good/Fair	storm damage	Remove
40	Norway spruce	*Picea abies*	20	Good/Fair	no issues	Remove
41	Norway spruce	*Picea abies*	22.3	Good/Fair	best if kept with #42	Remove
42	Norway spruce	*Picea abies*	21.5	Good/Fair	best if kept with #41	Remove
43	Norway spruce	*Picea abies*	24	Good	no issues	Remove
44	Black oak	*Quercus velutina*	27	Good	minor deadwood	Remove
45	Black oak	*Quercus velutina*	37.5	Good/Fair	large seam on lower trunk	Remove
46	Norway spruce	*Picea abies*	18.6	Good/Fair	Lawnmower damage, woodpeckers	Remove
47	White ash	*Fraxinus americana*	27	Poor	Emerald ash borer, dying	Remove
48	Mockernut hickory	*Carya tomentosa*	13.9	Good	no issues	Remove
49	Black oak	*Quercus velutina*	33	Good	no issues	Remove
50	Black oak	*Quercus velutina*	28.9	Fair	major deadwood, basal wound	Remove
51	Callery pear	*Pyrus calleryana*	8.5	Good/Fair	may not be Bradford. Cleveland Select?	Remove
52	Callery pear	*Pyrus calleryana*	8	Good/Fair	may not be Bradford. Cleveland Select?	Remove
53	Callery pear	*Pyrus calleryana*	8	Good/Fair	may not be Bradford. Cleveland Select?	Remove
54	Callery pear	*Pyrus calleryana*	7.3	Good/Fair	may not be Bradford. Cleveland Select?	Remove
55	Callery pear	*Pyrus calleryana*	5.5	Good/Fair	may not be Bradford. Cleveland Select?	Remove
56	Callery pear	*Pyrus calleryana*	4.3	Good/Fair	may not be Bradford. Cleveland Select?	Remove
57	Black oak	*Quercus velutina*	33.5	Good	no issues	Remove
58	Chestnut oak	*Quercus montana*	49	Good/Fair	phytophthora?, co-dominant	Remove
59	Pignut hickory	*Carya glabra*	15.8	Good	no issues	Remove
60	Flowering dogwood	*Cornus florida*	5.6	Good	no issues	Remove
61	Honey locust	*Gleditsia triacanthos*	11	Good/Fair	seam in trunk, root problems?	Remove
62	Honey locust	*Gleditsia triacanthos*	10.7	Good/Fair	phototropic lean	Remove
63	London planetree	*Platanus x acerifolia*	32.7	Exc.	no issues	Remove
64	Hemlock	*Tsuga canadensis*	5	Fair	growing in small nook of building	Remove
65	Kousa dogwood	*Cornus kousa*	6.2	Good	no issues	Remove
66	Red bud	*Cercis canadensis*	4.5, 6.5, 8.5, 3.5	Good	no issues	Remove
67	Sugar maple	*Acer saccharum*	26.5	Good/Fair	anthracnose	Remove
68	Sugar maple	*Acer saccharum*	27.7	Good/Fair	anthracnose	Remove
69	Black oak	*Quercus velutina*	40.4	Good/Fair	lean into lawn, water pooling at base	Protect
70	Pignut hickory	*Carya glabra*	10.6, 12.4	Good	appears to be two trees, but probably one	Protect
71	White oak	*Quercus alba*	27.7	Good	no issues	Protect
72	Black oak	*Quercus velutina*	33.8	Good	no issues	Protect
73	Chestnut oak	*Quercus montana*	26.6	Good/Fair	anthracnose	Protect
74	Northern red oak	*Quercus rubra*	19.6	Good/Fair	no issues	Protect
75	Northern red oak	*Quercus rubra*	26.3	Good	no issues	Protect
76	Black oak	*Quercus velutina*	26.2	Good/Fair	no issues	Protect
77	White oak	*Quercus alba*	31.9	Good/Exc.	no issues	Protect
78	White oak	*Quercus alba*	35	Good	co-dominant	Protect
79	Northern red oak	*Quercus rubra*	25.9	Good/Fair	sounds hollow	Protect
80	Chestnut oak	*Quercus montana*	23.4	Fair	major deadwood	Protect
81	Northern red oak	*Quercus rubra*	30.6	Good	no issues	Protect
82	Black oak	*Quercus velutina*	25.7	Good/Fair	major deadwood	Protect
83	Black oak	*Quercus velutina*	29	Good/Fair	no issues	Protect
84	Northern red oak	*Quercus rubra*	33	Good	phototropic lean	Protect
85	Black oak	*Quercus velutina*	38.4	Good	grass clippings at base	Protect
86	Black oak	*Quercus velutina*	29	Fair	lots of debris piled at base	Remove

1 TREE PRESERVATION TABLE

Fencing: Fencing shall be 6' tall chain link fencing set on steel posts and driven into the ground. Fencing shall not be supported by concrete blocks. Access should be provided within this zone for project arborist to inspect tree, and for any treatments to be applied. Fencing should be installed at the earliest possible time and set at the limits of disturbance.

Root pruning: The mechanical pruning of roots shall be performed by a circular rock saw. The most optimal time for root pruning is the dormant season (Dec.1-February 15). The depth of pruning shall be limited to depth of impact from surrounding activity. For example, if the detail for the new sidewalk is 12", then root pruning should be done to this depth. Roots found deeper than this may survive the construction activity and could be important for long-term tree survival.

Root pruning limits shall be at the limits of the tree save areas as shown on the accompanying tree preservation map. It shall be supervised by the project arborist, and notice sent to DC UFD arborist when this work is to occur.

Mulch: A layer of wood chips from tree care operations shall be applied on top of the root protection area to a depth of 2-4" and maintained at this depth for the length of construction. Mulch shall be applied within 7 days of root pruning operations. The area covered will be the entire area within the chain link fencing protection.

At the conclusion of construction, a layer of mulch shall be applied. This new mulch would most likely be shredded hardwood.

Tree growth regulator: A TGR containing the active ingredient Paclobutrozol shall be applied to all tree preservation candidates. This should be applied at the earliest possible date in 2021. This application will be effective for 3 years and may be repeated at the request of the project arborist.

Root protection during curb replacement: All roots exposed when the existing curb is removed must be covered in burlap. The burlap must be kept moist until a new curb is installed. Roots shall not be exposed to the air for more than 48 hours. The burlap will likely need to be sprayed down every 2-3 days depending upon the weather conditions. Supporting roots that may have grown over the curb shall be preserved. The underlying curb shall remain in place where it is needed for structural support. These areas shall be identified by the project arborist, and arborists from the DC UFD.

Canopy pruning: Canopy pruning to remove dead wood shall be at the direction of the project arborist. It shall be consistent with the ANSI A-300 Standards, *Pruning*. The preferred timing for this treatment is the dormant season (Dec. – February).

Supplemental irrigation: The level of irrigation required will depend in large part on the level of root loss. The project arborist may request supplemental irrigation during periods of drought for 2 growing seasons following the initial root pruning. Irrigation may be supplied by truck delivery, slow-release on-site systems or a drip irrigation system attached to a water supply and on a timer system.

Utility alignments: Any utilities that must bisect the tree preservation area will have to be installed by directional boring under the root system. Trenching of utilities across the tree save area is not permitted.

Arborist inspections: The project arborist should monitor the site at least one per month for the length of the project, and at the request of the project supervisor, or an arborist from the DC Urban Forestry Division.

Project arborist: The project arborist shall be Keith Pitchford, Pitchford Associates.
(202) 368-1033 (cell). Email: keith@pitchfordtrees.com

Sincerely,

Keith C. Pitchford
ISA Certified Arborist, MA-0178
ISA Certified Tree Risk Assessor
MD Licensed Tree Expert, #589
MD Licensed Forester, #675

2 TREE PROTECTION MEASURES
NTS

TACTICAL TRAINING DESIGN
Tactical Design North, Inc.
231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT
Jacobs Wyper Architects
1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER
Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, NY 10007

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER
A & J Consulting Engineering Services, P.C.
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2000 M Street NW, Suite 270, Washington, DC 20036

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CCI
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CIVIL ENGINEER
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Patricia Hord Graphik Design
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LANDSCAPE
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LIGHTING
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FOOD SERVICE
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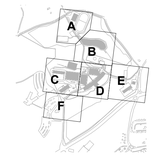
7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN
AQUA Design International
7536 N. La Cholla Blvd, Tucson, AZ 85741

KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	16 JUN 2023	ADDENDUM 27			
2	19 MAY 2023	ISSUED FOR BID			
1	18 FEB 2022	ISSUED TO L&I			

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PENNSYLVANIA REGISTERED LANDSCAPE ARCHITECT — MANG SHOW — REGISTRATION NUMBER LA-RA004941

SIGNATURE DATE

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250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

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TREE PRESERVATION TABLE

SHEET No. STE-L-010

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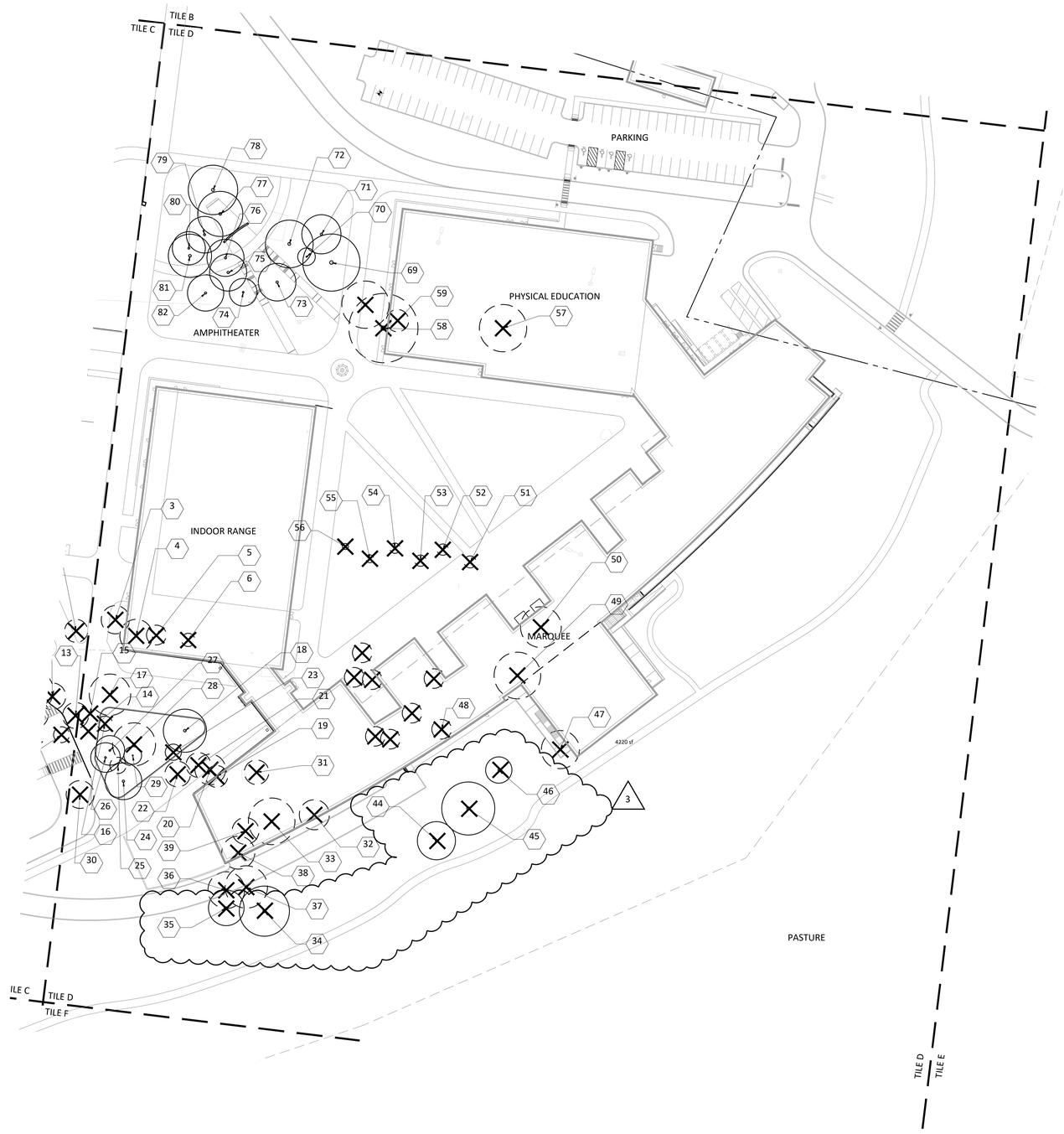
LB/DJ	BS	MAY 2023	AS NOTED

PAGE NUMBER



1 TREE PRESERVATION PLAN - TILE D
SCALE: 1:100

N

PROPERTY LINE
MATCH LINE
TREE TO BE PRESERVED
TREE TO BE REMOVED
EDGE OF WOODED AREA
EXISTING BUILDING
PROPOSED BUILDING

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Tactical Design North, Inc.
231 E. Buffalo St #502, Milwaukee, WI 53202

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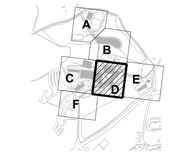

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TREE PRESERVATION PLAN - TILE D

SHEET No. STE-L-014

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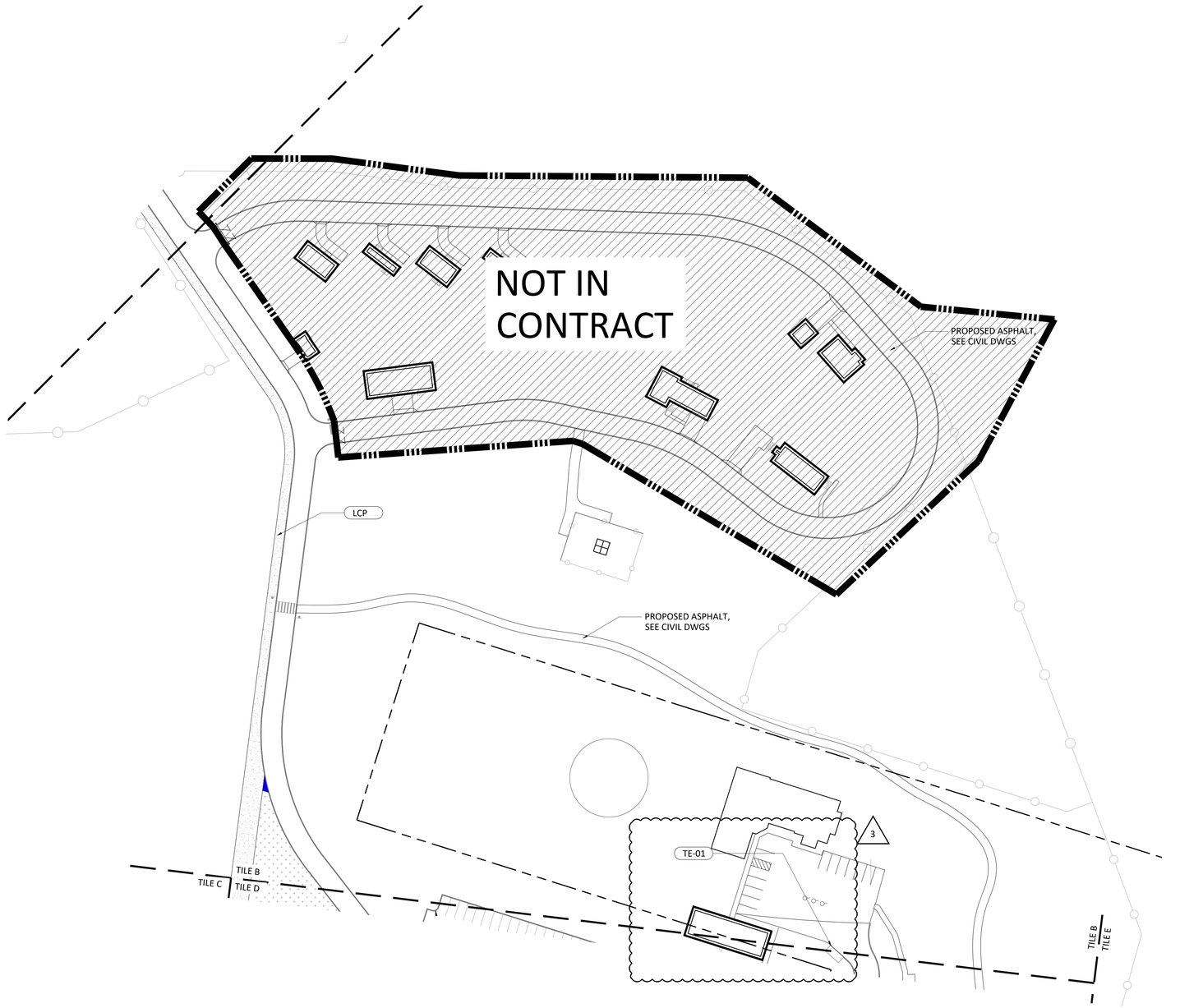

1 SITE MATERIALS PLAN - TILE B
SCALE: 1:50

N

LEGEND

PROPERTY LINE

MATCH LINE

SEE SITE-L-500 SERIES FOR PLANTING LAYOUTS

NOTES
SEE STE-L-600 SERIES FOR LIGHTING LAYOUTS

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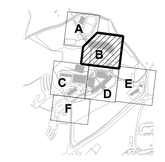

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SITE MATERIALS PLAN - TILE B

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STE-L-102

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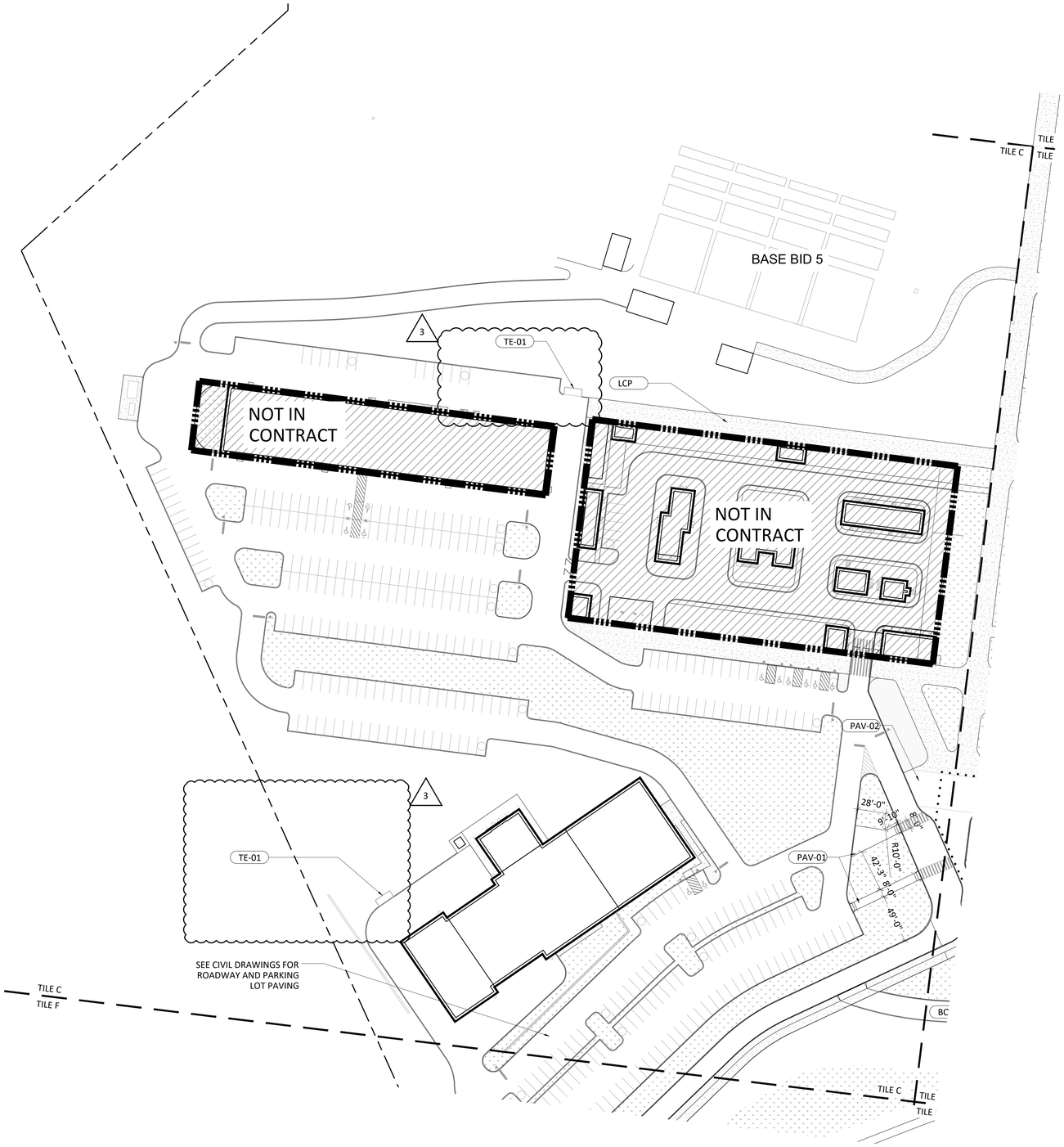

1 SITE MATERIALS PLAN - TILE C

SCALE: 1:50

N

LEGEND

PROPERTY LINE

MATCH LINE

SEE SITE-L-500 SERIES FOR PLANTING LAYOUTS

NOTES
SEE STE-L-600 SERIES FOR LIGHTING LAYOUTS

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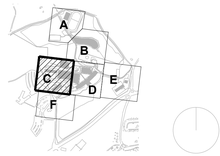

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250 Greenwich St, New York, 10007

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DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

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SITE MATERIALS PLAN - TILE C

SHEET No.
STE-L-103

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TAG	USE	MATERIALS	DIMENSION/ THICKNESS	FINISH / COLOR	JOINT	SETTING BED	MANUFACTURER/ MODEL	PATTERN	NOTES
LBCH-01	AMPHITHEATER BENCH	METAL	SEE PLAN	DARK GREY	N/A	N/A	VESTRE		SLATTED PERFORATED METAL TOP
		METAL					MMCITE		
		METAL WITH IPE BENCH TOP					N/A		
LBCH-02	AUDITORIUM ROOF BENCH	CAST STONE	SEE PLAN	POLISHED/BLACK			LANDSCAPE FORMS/SOCRATES BENCH		
BO-01	BOLLARD	BOLLARD		STAINLESS STEEL			AMERISTAR BULWARK SECURITY BOLLARD	N/A	SEE ALSO CIVIL DETAILS
							HELIO SECURITY BOLLARD/900 SERIES		
LCP	PIP CONCRETE PAVING	3' X 3' SCORED PIP CONCRETE	SEE CIVIL DRAWINGS FOR THICKNESS	LIGHT BROOM FINISH	SAWCUT SEE PLANS	N/A	N/A	SEE PLAN	SEE ALSO CIVIL DETAILS
LDG	DECOMPOSED GRANITE	DECOMPOSED GRANITE	N/A	SUBMIT ALL COLOR SAMPLES OF COLOR GOLD VARIETY	N/A	N/A	N/A	N/A	
LME-01	METAL EDGE	ALUMINUM	5.5"X6.5" GEOEDGE WITH BASE IN CORNER	BLACK DURAFLEX	N/A	N/A	PERMALOC	N/A	
PAV-01	CONCRETE PAVERS AT GRADE	SERIES CONCRETE PAVERS	7 7/8" X 7 7/8" X 2 3/4"	MOUNTAIN MIST	CONCRETE SAND	1" SAND	UNILOCK/SERIES PAVER	SEE PLAN	
				CHARCOAL			NITTERHOUSE/INTERLOCKING PAVER		PAV-01 ALT 1
				CHARCOAL			HANOVER/PREST PAVER		PAV-01 ALT 2
PAV-02	CONCRETE PAVERS AT GRADE	PLANK PAVER	8" X 24" X 2.75"	OPAL	CONCRETE SAND	1" SAND	UNILOCK / PROMENADE PLANK PAVER	SEE PLAN	
				PG-2			NITTERHOUSE/URBAN STONE		PAV-02 ALT 1
				NATURAL			HANOVER/PLANKSTONE PAVERS		PAV-02 ALT 2
PAV-03	CONCRETE PAVERS	PLANK PAVER	8" X 24" X 2.75"	STEEL GREY BLEND	CONCRETE SAND	1" SAND	UNILOCK / PROMENADE PLANK PAVER	SEE PLAN	PAVERS ON GRADE TO BE OVER CONCRETE BASE PER 3/STE-L-900 PAVERS OVER MARQUEE BUILDING LEVEL 0 TO BE ON AGGREGATE BASE PER 8/STE-L-900 PAVERS OVER MARQUEE AUDITORIUM ROOF TO BE ON PEDESTALS PER 6/STE-L-900
				PG-60			NITTERHOUSE/URBAN STONE		PAV-03 ALT 1
				LIMESTONE GRAY			HANOVER/PLANKSTONE PAVERS		PAV-03 ALT 2
PAV-04	CONCRETE PAVERS AT GRADE	PLANK PAVER	4" X 12" X 2.75"	BLACK GRANITE	CONCRETE SAND	1" SAND	UNILOCK / PROMENADE PLANK PAVER	SEE PLAN	
							NITTERHOUSE/URBAN STONE		PAV-04 ALT 1
							HANOVER/PLANKSTONE PAVERS		PAV-04 ALT 2
LST-01	RIVER ROCK	RIVER ROCK	3"-5" DIA. DISC SHAPE	NATURAL	N/A	N/A	CARDEROCK STONE/DELAWARE RIVER STONE	N/A	PROVIDE 6" CONTINUOUS STRIP BETWEEN ALL PLANTING BEDS AND BUILDING EDGES
TE-01	TRASH ENCLOSURE	CHAIN LINK FENCE	6' HEIGHT	SEE SPECIFICATION 323113					

3

1 MATERIALS SCHEDULE

TACTICAL TRAINING DESIGN

Tactical Design North, Inc.
231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT

Jacobs Wyper Architects
1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER

Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, NY 10007

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

A & J Consulting Engineering Services, P.C.
164 Brighton Rd, Clifton, NJ 07012

MECHANICAL, AVIIT ENGINEER

Interface Engineering, Inc.
2000 M Street NW, Suite 270, Washington, DC 20036

ACOUSTICAL ENGINEER

Cerami
1001 Ave of the Americas, 4th Floor, New York, NY 10018

CODE CONSULTING

CCI
215 W 40th St, 10th Floor, New York, NY 10018

CIVIL ENGINEER

Langan
1818 Market St #3300, Philadelphia, PA 19103

VERTICAL TRANSPORT

Michael Blades & Associates Ltd.
5409 Rapidan Ct, Lothian, MD 20711

SIGNAGE CONSULTANT

Patricia Hord Graphik Design
119 S. St. Asaph St, Alexandria, VA 22314

LANDSCAPE

Lee and Associates, Inc.
638 I Street NW, Washington, DC 20001

LIGHTING

MCLA
1000 Patomic St NW, Suite 121, Washington, DC 20007

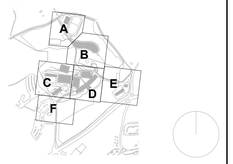
FOOD SERVICE

Hopkins Foodservice Specialists, Inc.
7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN

AQUA Design International
7536 N. La Cholla Blvd, Tucson, AZ 85741

KEYPLAN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	16 JUN 2023	ADDENDUM 27			
2	19 MAY 2023	ISSUED FOR BID			
1	18 FEB 2022	ISSUED TO L&I			

RECORD REVISIONS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
BUREAU OF ARCHITECTURE AND ENGINEERING
REGISTERED LANDSCAPE ARCHITECT
REGISTRATION NUMBER LA 001401

SIGNATURE DATE

ARCHITECT

Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

VERIFY SCALE

BAR IS ONE (1) INCH LONG
ON ORIGINAL DRAWING:
0 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

MATERIALS SCHEDULE

SHEET No.
STE-L-110

DRAWN BY	CHECKED BY	DATE	SCALE
LB/DJ	BS	MAY 2023	AS NOTED