

DATE: July 6, 2023

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

ADDENDUM NO. 31

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 - In response to questions submitted, please note the following:

.1 CONTRACT

- Question 99: Masonry : Drawings ITV-A-111 and ITV-A-602 shows a masonry partition along column line M10 that does not have a label. Please confirm N1 is the correct masonry partition type.
- Response: Specification section 2301517 is not issued and is not applicable to this project. References will be removed in an upcoming addendum.
- Question 107: Abatement : Spec 020800 notes that all layers of flooring needs to be removed at areas where ACM is identified. Please confirms types of flooring and layers where ACM is identified in order to provide a price.
- Response: A bulk of the areas (90% +) were observed to have one layer of ACM tiles. In limited areas, the ACM floor tiles may be covered with non-ACM tiles, and therefore, the note represents removing all layers of tiles.

- Question 108: Abatement : Abatement spec 020800 and H series drawings note that Abatement contractor is responsible for all ACM removal whether it has been identified or not. This is not quantifiable or reasonable for a hard bid situation to know what cost to include. Please provide specific direction/quantities or an allowance for this work.
- Response: Based on our inspections, all identified ACM included in the bid documents must properly removed and/or managed during demolition. Any additional material that is discovered during construction will also need to be properly abated. Any additional scope of work uncovered will be evaluated based on unit prices provided. The unit price specification includes line items for ACM as add/deduct.
- Question 109: Builder's Risk : We are being told by our builder's risk broker that the Marquee building could be classified as a mass timber project and will require special insurance. Should this building be classified as mass timber?
- Response: Project is of Construction Types listed on LS-Series drawings under 2015 IBC.
- Question 110: Existing Kennel Buildings : Spec section 013110 notes that the existing kennel building can be demolished at any time for the construction of the BESO building. At the pre-bid, it was mentioned that the BESO building needed to be in phase 2. Please confirm.
- Response: Confirmed that critical path sequencing noted in 013110 should be used in contractor's development of phasing schedule. The contractor needs to sequence the demolition of existing BESO building and facilities not only with the construction of the new BESO but with their means and methods and temporary staging requirements.
- Question 111: Geothermal Wells: Do all of the geothermal well fields need to be installed and activated for the turnover of the Marquee building? If so, this creates a phasing issue with the existing buildings that need to remain during the construction of the Marquee building such as, stables, garage building A, garage building b, and existing headquarters.
- Response: Design and construction of the wellfield is delegated design and should be completed as determined necessary by the wellfield contractor/wellfield engineer to support the full load of the buildings. Coordination with NIC work contractor will be required after award. Refer to revised STE-C-401, 403, 701, and 703 as issued in Addendum 31 to show the location of the Geothermal Well Field.
- Question 112: Temporary Access Roads : Drawing STE-C-811 shows a conceptual access road the goes through a drainage basin and yard inlet. Please advise.
- Response: Temporary access road alignment is conceptual and contractor can adjust as needed.
- Question 116: Ceiling Trim : Specification Section 092116 Gypsum Board Assemblies 2.7 Trim Accessories B. Metal Specialty Accessories 1. (call out the following) b. Channel Wall Reveal, c. Rounded Outside Corner d. Base Reveal e. W-Reveal f. Corner Trim g. Column Collar h. Partition End Caps. I do not see any of these trims shown on the drawings. Are any of these trims to be used in the project?
- Response: Accessories b - Channel Wall Reveal, c - Rounded Outside Corner, d - Base Reveal, g - Column Collar, and h - Column Collar are not included in the drawings. See GEN-A-750, GEN-A-751, for instances of e - W-Reveal and f - Corner Trim. Trim accessories required as detailed at reveals. Trim accessories required as detailed at corner reinforcement. Revised specification section 092116 will be included in an upcoming Addendum.
- Question 117: Abuse vs impact : Specification Section 092166 Gypsum Board Assemblies 2.4 Gypsum Board Materials Gypsum Board 1. Provide Abuse Resistant Panels for the first 8 ft. of all gypsum board

partitions, unless otherwise indicated. 3.4 C. Panel Materials 1. General Install Impact Resistant panels for the first 8ft. of all gypsum board partitions. Please clarify either Abuse or Impact board. There is a significant difference in cost.

- Response: First 8' Impact resistant panels (as referenced in 092166 3.4C) are only required for walls of gymnasiums in GYM building. First 8' Abuse-resistant panels (as reference in 092166 2.4) applies to corridor walls only. Revised specification section will be issued in an upcoming addendum.
- Question 119: Door Finish : Please confirm that doors listed with a painted finish in the door schedule are to be factory painted and not field painted.
- Response: Doors listed with painted finish are to be field painted. Refer to spec section 081113 for factory priming and painting requirements.
- Question 120: Door schedule : Please provide door schedule for OTV Pump House
- Response: Response will be provided in an upcoming addendum.
- Question 121: OTV Window : OTV-PH -A-101 calls for (2) W10 windows. Please provide spec and schedule for W10 window.
- Response: Response will be provided in an upcoming addendum.
- Question 122: Bollards : Please confirm where detail 5/MAQ-S-322 for bollards applies.
- Response: Refer to ITV-A-630. Detail applies at training bollards denoted as BO-04. Bollards on exterior (denoted as BO-02) should refer to civil drawing details for bollards.
- Question 123: Curbs : Please provide locations of where curb details 7/MAQ-S-322 apply. They aren't shown on MEP drawings.
- Response: Refer to A-100 series plans. Curbs are typically denoted in mechanical and plumbing rooms with M5 keynote.
- Question 124: MEP Pads : Please confirm where 6/MAQ-S-322 for concrete pads applies. These aren't shown on drawings or MEP drawings.
- Response: Refer to note 10 on GEN-S-014. Refer to A-100 series plans. Pads are typically denoted in mechanical and plumbing rooms with M4 keynote.
- Question 125: MAQ-S-533 : Please confirm where details 1, 2, and 3 on MAQ-S-533 apply on the project as they don't seem to be shown on .1, .2, .3, and .4 drawings.
- Response: Refer to note 10 on GEN-S-014. Refer to A-100 series plans. Pads are typically denoted in mechanical and plumbing rooms with M4, G3 and G10 keynotes.
- Question 126: GYM 2nd Floor : There isn't any information on the 2nd floor structure for the GYM in regard to whether it has a concrete slab on deck? If so, provide thickness and reinforcing.
- Response: The floor construction is to be composite metal deck slab, refer to spec 133419, Metal Building System. Slab shall be designed as part of pre-engineered metal building.
- Question 127: BESO 2nd floor : There isn't any information on the 2nd floor structure for the BESO in regard to whether it has a concrete slab on deck? If so, provide thickness and reinforcing.
- Response: The floor construction is to be composite metal deck slab, refer to spec 133419, Metal Building System. Slab is considered a mezzanine and shall be designed as part of pre-engineered metal building.
- Question 128: OTV Structure : Please provide structural details for thickness, reinforcing, etc for the OTV Pumphouse concrete.
- Response: Refer to revised OTV-PH-S-101 and new drawing GEN-S-410 as issued in Addendum 31.

- Question 129: Pumphouse : Drawing OTV-PH-A250 shows turndown slabs in some details but shows a footing in detail 3. Please advise.
- Response: The pump house perimeter frost wall is supported by strip footing, refer to structural drawing, detail 1 on OTV-PH-S-101, issued in Addendum 27 dated June 16, 2023, for foundation information.
- Question 130: Auditorium : Please confirm PAV-01 pavers are to be installed at the east and west ramps outside the auditorium.
- Response: Confirmed. See MAQ-A-381.
- Question 131: Underslab Insulation : The drawings are not clear on where underslab insulation is to go and the thickness. It seems to show at the following locations: Lobby of FTUE, Food storage room in BSO, Pumphouse, and East and West ramps outside Auditorium. Please confirm these locations and thickness and advise on any other locations.
- Response: Response will be provided in an upcoming addendum.
- Question 132: Monitoring of Structures : Please confirm this monitoring is only needed during the installation of the soil nail wall and that once the wall is complete, no more monitoring is needed.
- Response: Monitoring should continue until the slab of the ground level floor of the Marquee building is constructed unless otherwise agreed to with the Department and the Department's Professionals. Refer to revised spec sections 310901 and 313236 as issued in Addendum 31.
- Question 133: Perimeter Insulation : Please confirm locations for perimeter insulation on the interior face of foundation walls. The drawings are unclear.
- Response: Response will be provided in an upcoming addendum.
- Question 134: Cementitious Underlayment : Please confirm where spec 035416 for cementitious underlayment applies.
- Response: 035416 Cementitious Underlayment applies as required as leveling material below carpet installations.
- Question 135: Exterior Testing : Spec 080350 3.5C calls for off-site mock-up and testing for "each specific exterior enclosure system utilized on this project". Please confirm the off site inspection can be waived and that it can all be on site for the mock-ups shown on the GEN-A drawings. If not, please clarify what "each specific exterior enclosure system" means.
- Response: Confirmed that inspections and testing as referenced in 080350 3.5C can be performed on-site for mockups shown on GEN-A drawings.
- Question 136: stonework: In response to question 78 on Addendum 28; It is our understanding ST-03 Black Slate cannot be fabricated in the size and thickness shown on STE-A-702 and STE-A-701. Lamination will be required to achieve the heights. Many joints will be visible. Can a substitute be considered for the base bid prior to award?
- Response: Substitutions will not be considered prior to base bid award.
- Question 137: Overhead Doors: Drawing ITV-A-603 shows (1) OHD-08 and drawing ITV-A-606 shows (2) OCD-01. These items are not on the door schedule. Please advise.
- Response: Response will be provided in an upcoming addendum.
- Question 138: Flagpole : Specification 107500 calls for a stainless steel pole with a 12" base. The BOD manufacturer only provides 8" bases. Is 12" required or would a standard 8" be acceptable?
- Response: Bases are acceptable in recommended sizes by BOD manufacturer.

- Question 139: SDB/VBE : Please confirm that subs of subs can qualify to meet the SDB/VBE goals in order to have a better chance of meeting the goals.
- Response: Please read both the SDB Participation Packet and the VBE Participation Packet as they provide the complete details. As they state, an Offeror can meet the SDB and VBE participation goals by being an SDB Prime or VBE Prime that is self-performing or by utilizing SDB/VBE subcontractors, SDB/VBE manufactures, SDB/VBE stocking suppliers, and SDB/VBE non-stocking suppliers or by utilizing a combination of them. However, an Offeror cannot use a sub-subcontractor, at any tier, towards the participation goals because the Offeror is not in contract with the sub-subcontractor.
- Question 140: Special Inspections : It isn't clear who is to provide the special inspections in section 033000 3.11. Please clarify
- Response: Special inspections in each technical specification (including section 033000) are part of the Contractor's Quality Control responsibilities.
- Question 141: Special Inspections : Please confirm the special inspections in section 051200 3.8 are by the owner.
- Response: Special inspections in each technical specification (including section 051200) are part of the Contractor's Quality Control responsibilities.
- Question 142: Metal Fabrication Testing : Spec 055000 2.16B calls for a " full time inspection agency to perform testing and inspection services for metal fabrication work". Please provide more specifics for this requirement. Which metal fabrication work needs inspected? Does this need to be full time while any metal fabrication work is being done?
- Response: Response will be provided in an upcoming addendum.
- Question 143: Exterior Enclosure Testing : Please confirm the exterior enclosure testing per 080350 3.5 is only needed for the Marquee building.
- Response: Exterior enclosure testing requirements per 080350 section 3.5D apply as follows: Subsections 1, 4 and 5 apply to the Marquee building only. Subsections 2, 3 and 6 apply to all buildings.
- Question 144: Special Inspections : Please confirm that the owner is responsible for the special inspections in section 133419 3.10.
- Response: Special inspections in each technical specification (including section 133419) are part of the Contractor's Quality Control responsibilities.
- Question 145: STC Testing : Please confirm where the testing in 092116 3.19C applies on the project.
- Response: Testing applies to one dorm room, one classroom, the Auditorium (M-0220), and Major's Office (M-0355). Spec section will be revised in an upcoming addendum.
- Question 146: Spec 313236 : Spec 313236 1.8E calls for a PE to be hired for the design and approval of soil nail work. It also notes this PE is to be at "all" meetings. Please confirm the PE can be an employee of the soil nail contractor and that he only needs to be present at meetings related to soil nail walls and not "all" meetings.
- Response: Correct, the design engineer shall participate in all soil nail design, construction and monitoring related meetings, not all meetings for the entire project.
- Question 147: Permits : Sec 310901 1.5C notes that the contractor is to secure and pay for permits this section. If the building permit is secured by the Owner. What permit would be required for this work?

- Response: Contractor is responsible for determining what permits are required to execute their work beyond those obtained by the Department.
- Question 148: Permits : Sec 310000 3.2D notes that the contractor is to secure and pay for permits this section. If the building permit is secured by the Owner. What permit would be required for this work?
- Response: Contractor is responsible for determining what permits are required to execute their work beyond those obtained by the Department.
- Question 149: Permits : Spec 313236 1.8F notes that the contractor is to secure and pay for permits this section. If the building permit is secured by the Owner. What permit would be required for this work?
- Response: Contractor is responsible for determining what permits are required to execute their work beyond those obtained by the Department.
- Question 150: Permits : Sec 316848 1.6F notes that the contractor is to secure and pay for permits this section. If the building permit is secured by the Owner. What permit would be required for this work?
- Response: Contractor is responsible for determining what permits are required to execute their work beyond those obtained by the Department.
- Question 151: Permits : Spec 328400 1.7 notes that the contractor is to secure and pay for permits this section. If the building permit is secured by the Owner. What permit would be required for this work?
- Response: Contractor is responsible for determining what permits are required to execute their work beyond those obtained by the Department.
- Question 152: Structure : Please provide a structural framing plan and details for the structure of the mezzanine in the Gym building.
- Response: The mezzanine structure should be designed as part of pre-engineer metal building, refer to spec 133419, Metal Building System.
- Question 153: Structure : Please provide a structural framing plan and details for the structure of the 2nd level in the BESO building.
- Response: The 2nd level structure should be designed as part of pre-engineer metal building, refer to spec 133419, Metal Building System.
- Question 154: Casework : In response to question/response 67 on Addendum 28; the question was referring to the ADA vanity panel below the countertop, not the countertop. Please indicate if the vanity panel material is to be solid surface, plastic laminate or other. Please provide an updated detail with labels for 1/GEN-A-771.
- Response: Response will be provided in an upcoming addendum.
- Question 155: Structure : Please provide a structural framing plan and details for the roof structure on the Gym building.
- Response: The roof structure is part of pre-engineer metal building, refer to spec 133419, Metal Building System.
- Question 156: Structure : Please provide a structural framing plan and details for the roof structure on the FTU building.
- Response: The roof structure is part of pre-engineer metal building, refer to spec 133419, Metal Building System.
- Question 157: Pumphouse : Details 3/OTV-PH A-250 and 4/OTV-PH A-250 refer to structural drawings for both the masonry and concrete roof deck however, structural drawings have not been provided. Please advise.

- Response: Refer to OTV-PH-S-101, as issued in Addendum 27 on June 16, 2023. Refer to GEN-S-611, GEN-S-112, and GEN-S-113 for masonry details, and refer to GEN-S-410 as issued in Addendum 31 for concrete roof details.
- Question 158: CMU : Detail 3/OTV-PH A-250 indicates CMU-03 for the facade and refers to GEN-A-580 for additional details. Detail 1/GEN-A-580 indicates CMU-01 for the facade. Which is correct?
- Response: Response will be provided in an upcoming addendum.
- Question 159: Metals : Detail 1/GEN-A-580 shows a metal angle MFAB-04 however MFAB-04 is not listed in the Keynotes or the specifications. Similar occurs on detail 2/MAQ-A-558 with MFAB-07 and MFAB-08. Sizes of these items are not defined. Additionally, shelf angels sizes are not defined anywhere. Please indicate the sizes of all L-angle steel shown throughout the drawings. Reference GEN series drawings; A-520, A-521, A-540.
- Response: Response will be provided in an upcoming addendum.
- Question 160: Structure : Please provide details for the suspended structure above the range baffles shown on 2/FTU-A-660. What is the assembly?
- Response: Response will be provided in an upcoming addendum.
- Question 161: Roof Hatches : How are people to access the catwalk door in the FTU building? Roof hatches are shown on drawing FTUE-A-103 however, there are no ladders shown. Please advise.
- Response: Response will be provided in an upcoming addendum.
- Question 162: Range : Please provide details for the suspension system for the range baffles in the FTU building. Reference 2/FTU-A-660, 5/FTU-A-720, and 8/FTU-A-720. What is the material?
- Response: Response will be provided in an upcoming addendum.
- Question 163: Caulk : Please confirm MEP contractors will caulk their own penetrations.
- Response: Confirmed, MEP contractors will be required to caulk their own penetrations.
- Question 164 : Louvers : Please confirm the louvers are to be supplied by the .2 contractor per the summary of work even though there is a spec in the general trades for these louvers.
- Response: Louvers are to be furnished by .2 HVAC contractor and installed by .1 General Contractor as part of exterior enclosure system. Refer to spec section 010100, 1.5 B.
- Question 165: Louvers : The size of the louvers don't seem to be coordinated between the HVAC drawings and the Architectural drawings. For example, MAQ-A-212 shows LVR-01 as 9'x27' and MAQ-M-111 shows the same louver as 15'x12'. Please clarify.
- Response: Louver size as shown on architectural drawings is correct. Revised MAQ-M-111 will be issued in an upcoming addendum correcting louver size.
- Question 166: Unit Prices : More information is needed on the types of materials and thicknesses that the ACM waterproofing is on for Unit Prices 27 and 30 in order to provide an accurate price. Please advise.
- Response: These are assumed ACM concealed items, nonetheless, waterproofing membranes typically consists of ~ 1/8 -inch thick single-ply bitumen, elastomeric or thermoplastic membranes, liquid applied using bituminous material.
- Question 167: Unit Prices : More information is needed on what the ACM waterproofing is mounted to for Unit Price #31 in order to price. Please advise.

- Response: These are assumed ACM concealed items, nonetheless, waterproofing membranes typically consists of ~ 1/8 -inch thick single-ply bitumen, elastomeric or thermoplastic membranes, liquid applied using bituminous material. Spec 020800 has been revised as issued in Addendum 31.
- Question 168: UST-004 : Drawing STE-C-304 calls for an underground storage tank to be removed. Please confirm the tank size, contents in tank, tank construction, and amount of contents left in tank.
- Response: Based on field notes and geophysical survey, the empty underground 3,000 gallon diesel fuel double-walled tank is approximately 7 feet in diameter and 13 feet across in length. The tank is approximately 4 feet below grade.
- Question 169: Zip Sheathing : What is the thickness of the zip sheathing shown on detail 3/FTUE-A-521?
- Response: Response will be provided in an upcoming addendum.

.2 CONTRACT

- Question 19: HVAC-17 Specification Section 230517 - References are made referring to Specification Section 230517 "Sleeves and Seals for HVAC Piping". Provide 230517 Section if applicable.
- Response: Specification section 2301517 is not issued and is not applicable to this project. References will be removed in an upcoming addendum.
- Question 31: Ethernet Cabling Responsibilities : Please clarify who is responsible for ethernet cabling from the data closets to IP based BAS control panels and equipment with BAS IP integration.
- Response: Data drops and cabling to be provided by .4 contractor. Refer to Technology drawings for locations.
- Question 33: Condensation Sensors Alternative : Regarding specification 230900, 2.14, DD: The condensation sensor manufacturer listed is no longer in business. Is Kele WD-1B and acceptable alternative?
- Response: 230900.2.14.DD.6 also lists an approved equivalent manufacturer. Manufacturer is acceptable as long as it meets substitution requirements stated in Spec 230000.1.04.C.10.

.3 CONTRACT

- Question 1: Fire protection piping schedule : To help get the project in budget we are suggesting using the industry standard fire protection piping which is 2" pipe and larger to be schedule 10 pipe with grooved fittings. This will save money on materials, labor and fabrication.
- Response: Response will be provided in an upcoming addendum.
- Question 2: Plumbing unit prices and allowances : Please review the plumbing unit prices and allowances, to save money and help get the project in budget please delete the mineral wool insulation(since it isn't used on the project) and reduce the quantity allowance of hub & spigot cast iron soil pipe and hangers since all the aboveground piping is hubless cast iron and none of the drainage piping is larger than 8".
- Response: Response will be provided in an upcoming addendum.

.4 CONTRACT

- Question 9: Manholes : Dwgs. MAQ-TC-401, STE-C-703 & STE-C-706 show ISP Manholes 10, 11 & 12 being installed in this phase. Dwg. STE-TC-010 does not show these manholes installed in this phase. Please advise.

- Response: ISP Vaults 10, 11 & 12, are to be installed in Package 6, Phase 2. A Delta 5. Refer to revised MAQ-TC-401 as issued in Addendum 31 clouding and hatching the three ISP vaults.
- Question 10: Transformer : Dwg. BSO-E-402 one-line diagram shows transformer "T-3". The transformer schedule does not show this transformer. What size is the transformer?
- Response: Refer to revised drawing BSO-E-402 as issued in Addendum 31, modified to update diagram.
- Question 11: Audiovisual : Good Afternoon! Will the audiovisual package be coming out separately to bid or will this portion of the project be going direct? My firm is interested in the a.v. design/installation/service portion of this project. Thank you for your response.
- Response: Response will be provided in an upcoming addendum.
- Question 12: Feeder Size : Dwg. BSO-E-402 one-line indicates transformers "T-2" & "T-3" have a primary feeder tagged "F350B". This feeder designation does not appear on the feeder schedule. Please provide a feeder size for these transformers.
- Response: Refer to revised drawing BSO-E-402 as issued in Addendum 31, modified to update tags.
- Question 13: Panels : Dwg. MAQ-E-501 one-line shows panel EGL feeding E1L, E2L, E3L & E4L.. We do not see these panels on the floor plans. Also, no panel schedules have been located. Please provide locations & panel schedules for these panels.
- Response: Refer to revised drawings MAQ-E-121, 122, 131, 132, 141, 142, 151, 152, 603, 609 as issued in Addendum 31, modified to match floor plans with schedules.
- Question 14: Breaker and Feeder Information : Dwg. MAQ-E-501 one-line diagram shows DP-MGH with an 800A breaker and a feeder with no tag to panel PH-H in the Pump House. Dwg. MAQ-E-610 panel schedule for DP-MGH shows a 400A breaker with 4/600MCM conductors feeding PH-H. Dwg. MAQ-E-609 panel schedule for PH-H with a 800A main breaker. Please provide correct breaker and feeder information.
- Response: Refer to revised drawing MAQ-E-610 as issued in Addendum 31, modified to update schedule.
- Question 15: Transfer Switches and Feeder Question : Dwg. MAQ-E-501 shows Automatic Transfer Switch A-FP w/load side feeder FP200 to the Fire Pump in the Pump House Building. Dwg. OTV-F-101 plan view & the Fire Pump Specification indicates a fire pump controller with integral ATS. MAQ-E-501 indicates that the normal Fire Pump feed comes directly from the pad mounted utility transformer. Panel schedule PH-H shows the "Fire Pump Skid" being fed from this panel via a 600A breaker. How many transfer switches feed this pump? Which Feeders are correct? Please advise.
- Response: Refer to revised drawing MAQ-E-501 as issued in Addendum 31, updated to show correct information .
- Question 16: Transformer Question : Dwg. MAQ-E-609 panel schedule PH-H circuit 37, 39, 41 description says 45 KVA transformer. Dwg. MAQ-E-502 says transformer in the Pump House is 112.5 KVA. Please advise.
- Response: Refer to revised drawings MAQ-E-609 and STE-E-100 as issued in Addendum 31, updated to revise schedules.
- Question 17: Panel Schedule : Dwg. MAQ-E-501 one-line diagram shows panel MGHE being fed from DP-MGH. We have not found a panel schedule for MGHE. Please provide one.
- Response: Refer to revised drawings MAQ-E-501 and STE-E-100 as issued in Addendum 31, modified to update diagrams.

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

020800 / Asbestos Abatement Work / Revised
220719 / Plumbing Piping Insulation / Revised
310901 / Monitoring of Structures and Utilities / Revised
313236 / Soil Nailing / 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-401 / SITE PLAN 1 / Revised
STE-C-403 / SITE PLAN 3 / Revised
STE-C-701 / UTILITY PLAN 1 / Revised
STE-C-703 / UTILITY PLAN 3 / Revised
ITV-A-111 / FLOOR PART PLAN B - LEVEL 0 / Revised
ITV-A-602 / BUILDING 3 - PLANS - ELEVATIONS / Revised
GEN-S-410 / REINFORCED CONCRETE SLAB SCHEDULE AND DETAILS / Issued
OTV-PH-S-101 / FRAMING PLANS - LEVEL 1 AND 2 / Revised
STE-E-100 / SITE PLAN - ELECTRICAL SYSTEMS / Revised
MAQ-E-121 / FLOOR PLAN - PART PLAN B - LEVEL 1 - ELECTRICAL SYSTEMS / Revised
MAQ-E-122 / FLOOR PLAN - PART PLAN C - LEVEL 1 - ELECTRICAL SYSTEMS / Revised
MAQ-E-131 / FLOOR PLAN - PART PLAN B - LEVEL 2 - ELECTRICAL SYSTEMS / Revised
MAQ-E-132 / FLOOR PLAN - PART PLAN C - LEVEL 2 - ELECTRICAL SYSTEMS / Revised
MAQ-E-141 / FLOOR PLAN - PART PLAN B - LEVEL 3 - ELECTRICAL SYSTEMS / Revised
MAQ-E-142 / FLOOR PLAN - PART PLAN C - LEVEL 3 - ELECTRICAL SYSTEMS / Revised
MAQ-E-151 / FLOOR PLAN - PART PLAN B - LEVEL 4 - ELECTRICAL SYSTEMS / Revised
MAQ-E-152 / FLOOR PLAN - PART PLAN C - LEVEL 4 - ELECTRICAL SYSTEMS / Revised
MAQ-E-603 / MECHANICAL PANEL SCHEDULES 3 OF 3 / Revised
MAQ-E-609 / LOAD CENTER SCHEDULES / Revised
MAQ-E-610 / DISTRIBUTION PANEL SCHEDULES / Revised
MAQ-TC-401 / SINGLE LINE DIAGRAM - TELECOMMUNICATIONS / Revised

SECTION 020800

ASBESTOS ABATEMENT WORK

DIVISION 0100 – 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.

1.2 The following sections specify the requirements for asbestos removal work of this Contract:

Division 0100 - General
Division 0200 - Scope of Work
Division 0300 – Definitions
Division 0400 - Submittals
Division 0500 - Codes, Regulations, Standards, and Notices
Division 0600 - Asbestos Removal Execution
Division 0700 - Abatement Clearance
Division 0800 - Project Close Out

1.3 All abatement work shall be performed in accordance with these specifications and the regulations of Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), National Institute of Occupational Safety and Health (NIOSH), Pennsylvania Department of Environmental Resources (PA DER), Pennsylvania Department of Labor and Industry (PA DOL) and all other applicable regulations and codes.

1.4 Whenever there is a conflict or overlap within these Specifications or between applicable codes and regulations, the most stringent provisions shall apply.

PART 2 - CONTRACTOR RESPONSIBILITIES

2.1 EXPERIENCE

- A. The Contractor performing the work of this Contract shall have a minimum of five years experience in performing licensed asbestos removal work and shall have recently completed not less than five pre-demolition asbestos removal projects in buildings with similar complexity and size.

2.2 CURRENT LEGAL REQUIREMENTS

- A. Current Legal Requirements shall mean any and all applicable laws, codes, regulations, ordinances, rules, guidelines, guidance documents, judgments, orders, decrees and other legal

requirements (collectively, "laws") promulgated by agencies having or claiming to have jurisdiction over and/or pertaining to reporting, licensing, permitting, investigation and remediation of omissions, discharges, Releases (as defined herein) or Threats of Release (as defined herein) of Asbestos Containing Materials, and other materials as are now or may hereinafter be regulated by applicable Current Legal Requirements into the air, surface water, groundwater or land, or relating to the disturbance, removal, use, treatment, storage, disposal, transport or handling of Regulated Materials, and any licenses, authorizations, clearances, permits, certifications, inspections and lien authorizations (collectively, "Licenses") required by any governmental authority in connection with Contractor's performance of the work. If Current Legal Requirements change during the work, compliance with Current Legal Requirements shall mean compliance with such changes whether or not the same require a different or higher standard than required by Current Legal Requirements in effect at the commencement of the work.

- B. The Contractor acknowledges that it and its employees are familiar with all Current Legal Requirements and agrees to perform the work in strict compliance with the same as the same may have been or may be promulgated, supplemented, amended or modified from time to time prior to, during, and as applicable after the completion of the work.

2.3 RISKS ASSUMED BY THE CONTRACTOR

- A. The Contractor assumes entire responsibility and liability for any and all damage or injury of any kind or nature whatsoever, including death resulting therefrom, to all persons, whether employees of the Contractor or otherwise, and to all property, caused by, resulting from, arising out of, or occurring in connection with the execution of the work; and if any person shall make such a claim now or indefinitely in the future for any damage or injury, including death resulting therefrom, the Contractor shall indemnify and hold harmless the Department and the Professional from any and all loss, expense, damage or injury that they may sustain as the result of any claim.

2.4 INDEMNIFICATION

- A. The Contractor and its subcontractors shall indemnify and hold harmless the Department, Professionals, and all other additional insured from and against all claims, damages, losses, liabilities and expenses, out of or resulting from the performance of the work specified herein.

2.5 PERSONNEL QUALIFICATIONS

- A. All Contractor personnel involved with asbestos removal work shall be thoroughly familiar with the standard operating procedure of the Contractor for removal work and all applicable regulations governing asbestos removal work. All personnel shall undergo the medical examinations required by OSHA. All supervisors and foremen shall be thoroughly familiar with all applicable regulations and practices for asbestos work, and shall have participated in at least ten removal projects as employees of the Contractor during the last two years. All personnel shall be trained in the use and care of respirators and shall pass an OSHA specified respirator fit test. Anyone without the above qualifications shall not be allowed work within the work area at anytime.
- B. Supervisor: Supervisor shall be provided by the Contractor for the work who is experienced in administration and supervision of asbestos removal projects including work practices, protective measures for building and personnel, disposal procedures, etc. This person is the Contractor's Representative responsible for compliance with all applicable Federal and State regulations,

particularly those relating to asbestos-containing materials. This person shall be responsible for the daily supervision, quality, and progress of the work, and be available to the Department's Representative and the Professional at all times while the work is in progress. The Supervisor shall have completed a course at an EPA Training Center or equivalent certificate course in asbestos removal procedures, have a minimum of five years on-the-job training in asbestos removal procedures, and have participated in at least ten asbestos removal projects as employees of the Contractor.

- C. Asbestos Removal Workers: Provide necessary manpower to perform the work in an efficient manner and within scheduled time limits. The asbestos workers shall have completed a course at an EPA training center or equivalent certified course in asbestos removal procedures and possess proper credentials and training for asbestos work under Pennsylvania regulations.
- D. Accreditation: The Supervisor shall be accredited as an Asbestos Abatement Supervisor in accordance with the AHERA regulation 40 CFR Part 763, Subpart E, Appendix C. The asbestos workers shall be accredited as Asbestos Abatement Asbestos Handlers in accordance with the AHERA regulations 40 CFR Part 763, Subpart E, Appendix C, and PADOL regulations.
- E. There shall be a sufficient number of trained and qualified workers, foremen, and supervisors to accomplish the work within the required schedule. Since general demolition work activities cannot start prior to the successful completion of asbestos removal work, it is imperative that a sufficient number of trained personnel be engaged throughout the work process. No untrained nor fully qualified and pre-approved person shall be employed to speed up completion of the work.

2.6 DAILY LOG

- A. The Contractor shall maintain at the site a daily log documenting the dates and time of, but not limited to, the following items:
 - 1. Meetings (include: purpose, attendees, brief discussions) and significant decisions.
 - 2. Visitations (include: authorized and unauthorized).
 - 3. Personnel, by name and asbestos worker certification number and date of expiration, entering and leaving the work area.
 - 4. Special or unusual events (i.e. barrier breaching, equipment failures, accidents, etc.)
 - 5. Personal air monitoring tests and test results as required by OSHA.
 - 6. Documentation, signed by the Contractor's certified personnel, of satisfactory completion of the following:
 - a. Inspection of work area preparation prior to start of removal and daily thereafter.
 - b. Removal of any sheet plastic barriers.
 - c. Contractor's certified inspections prior to encapsulation, enclosure or any other operation that will conceal the condition of ACM or the substrate from which such materials have been removed.
 - d. Removal of waste materials from work area (include quantities and manifests).
 - e. Decontamination of equipment (list items).
 - f. Contractors certified final inspection and final air test analysis.
 - 7. List of subcontractors at the site
 - 8. High and low temperatures, general weather conditions.
 - 9. Accidents and unusual events.
 - 10. Stoppages, delays, shortages, losses.

12. Emergency procedures.
 13. Orders and requests of governing authorities.
 14. Services connected, disconnected.
 15. Equipment or system tests and start-ups.
 16. Partial completions, or
 17. Substantial completions authorized.
- B. The daily log shall be available for review by the Department's Representative and the Professional at all times during the work. A copy of each day's activities and events as stated in the daily log shall be forwarded on a weekly basis to the Department and the Professional.

2.7 SPECIAL REPORTS

- A. General: Except as otherwise indicated, submit special reports directly to the Owner and Department's Representative within one day of occurrence requiring special report. Submit copy to Professional, and those affected by occurrence.
- B. Reporting Unusual Events: When an event of unusual and significant nature occurs at site (examples: failure of pressure differential system, rupture of temporary enclosures), prepare and submit a special report listing chain of events, persons participating, response by Contractor's personnel, evaluations of results or effects, and similar pertinent information.
- C. Reporting Accidents: Prepare reports of significant accidents, at site and anywhere else work is in progress. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

2.8 CONTINGENCY PLAN

- A. The Contractor shall prepare a contingency plan for emergencies including fire, accident, power failure, pressure differential system failure, supplied air system failure, or any other event that may require modification or abridgement of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency.

2.9 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall, at all times, guard the work area from injury or loss in connection with the work. The Contractor shall, at all times, guard and protect his work, and adjacent property. The Contractor shall replace or make good any loss or injury unless caused directly by the Department.
- B. The Contractor shall have full responsibility to install, protect, and maintain all materials and supplies in proper condition and forthwith repair, replace and make good any damage thereto until Project Closeout. The Contractor shall maintain an inventory of all materials and supplies for the work that are delivered to the work area or approved for storage facilities outside the work area.

2.10 ADJOINING PROPERTY

- A. The Contractor shall protect all adjoining property and shall repair or replace any property damaged or destroyed during the progress of the work.

2.11 DUTIES OF CONTRACTOR UPON TERMINATION

- A. In the event the Contract is terminated, the Contractor agrees that he shall leave the work area in such condition as it will not cause danger or risk of harm to any person lawfully frequenting the environment, or be subject to legal action for violations of Current Legal Requirements. Contractor represents that it shall leave the site so that there will be no risk of harm to the employees of other contractors, subcontractors, the Department, the Department's employees, and the occupants at the site.

2.12 ACCIDENT PREVENTION

- A. The Contractor shall, at all times, take every precaution against injuries to persons or damage to property and for the safety of persons engaged in the performance of the work. The Contractor shall establish and maintain at all times safety procedures in connection with the work as required by applicable regulations.

2.13 PROFESSIONAL STATUS REQUIREMENTS

- A. The Contractor shall comply, at its own expense, with all rules, regulations and licensing requirements pertaining to its professional status and that of its employees, partners, associates, subcontractors and others employed to undertake and complete the work hereunder.

PART 3 – MEETINGS

3.1 PRE-BID MEETING AND WORK AREA INSPECTION

- A. All Contractors submitting a bid shall attend pre-bid meeting and walk-through to be held at a location designated by the Department. This meeting will be followed by a walk-through of the work areas to familiarize the work. After the walk-through and prior to bids being due, the Contractor bidding on the work may visit the site to further familiarize them with the site conditions. All site visits must be coordinated and scheduled with the Department. The Contractor's visit and bid submission confirms his acceptance of the work and its condition as is.
- B. Project schedule, work area access, and other requirements relevant to the timely and satisfactory completion of the work of this Contract are discussed in the scope of work Division 0200 of this specification. Additional clarification may be presented by the Department during the pre-bid meeting.

3.2 PROJECT MEETINGS

- A. The Department's Representative will hold general progress meetings as required. The Professional and Contractor's supervisory personnel involved in planning, coordination, and/or performance of work shall attend each meeting.

DIVISION 0200 - SCOPE OF WORK

PART 1 - EXISTING CONDITIONS

1.1. The Pennsylvania State Police Academy is located at 175 Hersheypark Drive, just north of downtown Hershey, Pennsylvania. The site area is approximately thirty-four (34) acres situated on a hilltop, prominently visible across the area. The Academy has occupied this location since 1960. The campus has been continuously developed over the years to serve the Academy. Instructional, housing and campus support functions comprise the significant components of the campus along with exterior training areas including parade grounds and physical training areas, firing range, and parking for staff, cadets, transient in-service trainees, multiple fleet vehicles, and guests.

1.2 The estimated quantity of ACM affected by the scope of work is listed below:

Material	Location	Survey Results	Estimated Quantity of ACM	Comments
Main Building				
ACM/ASSUMED ACM FINDINGS				
Window glazing putty	Auditorium Lobby and Perimeter Walls Bldgs. A B E	ACM	5,000 LF	---
Sink undercoating - Off white	Medical Offices and Storage 1st Floor - Bldg. A	ACM	6 SF	---
Counter caulk with flashing - type 2	Roof - Lower Level next to Gym Wall	ACM	20 LF	---
9-inch floor tiles (various colors)	Scattered Locations	ACM	48,500 SF	---
12-inch white floor tiles	Electrical Room - Exterior of Bldg. C	ACM	50 SF	---
Mud-pack pipe joint insulation with fiberglass covering (observed)	Maintenance Shop - Ground Floor	ACM	35 Unit	---
	Video Room - Ground Floor Bldg. C	ACM	8 Unit	
	Stairwell Bldg. A next to Corridor to Bldg. E	ACM	8 Unit	
	Lockers/Restroom Area - Bldg. B Ground Level	ACM	15 Unit	
	Boiler Room - Bldg. B	ACM	1 Unit	
Mud-pack pipe joint insulation with fiberglass covering (estimated concealed)	Bldgs. A, B, C, D, E	ACM	2,000 Unit	Mud-pack pipe joints estimated concealed in wall, floor and ceiling cavities/chases/plenum spaces.
Textured ceiling/wall material	Auditorium Stage and Lobby Areas; and Mezzanine	ACM	2,500 SF	---

Material	Location	Survey Results	Estimated Quantity of ACM	Comments
Exterior window caulk	Bldgs. A, B, E	ACM	5,000 LF	---
Window caulk (interior)	Bldgs. A, B, E	ACM	5,000 LF	---
Transite window panel	Select Windows of Connectors between Bldgs. A and E; and Pool Bldg.	ACM	100 SF	---
Garage door window glazing putty	Maintenance Shop - Ground Floor Loading Dock	ACM	50 LF	---
Exterior caulk to panels under windows	Bldg. D and Store Wall of Bldg. C; Auditorium Lobby Wall	ACM	2,000 LF	---
Exterior black expansion caulk	Perimeter Wall	ACM	50 LF	---
Fire door core insulation	Select Areas	Assumed ACM	50 Unit	---
Blackboard / marker board glue concealed	Classrooms	Assumed ACM	450 SF	---
Electrical panel backing boards	Bldgs. A, B, C, D, E - Throughout	Assumed ACM	500 SF	---
Boiler rib gaskets	Bldg. B Boiler Room	Assumed ACM	400 LF	---
Concealed boiler breeching insulation within metal jacket	Bldg. B Boiler Room	Assumed ACM	500 SF	---
Concealed pipe and joint insulation, Transite conduits, waterproofing material that may exist concealed under building floor slabs	Bldgs. A, B, C, D, E - Throughout	Assumed ACM	3,000 LF	---
Shoot House				
<i>No ACM/ASSUMED ACM was identified in Shoot House.</i>				
Maintenance Building				
<i>ACM/ASSUMED ACM FINDINGS</i>				
Mud-pack pipe joint insulation with fiberglass covering	Scattered - Throughout	ACM	32 Unit	Exact locations to be determined during construction.
Garage window caulk	Garage Exterior	ACM	125 LF	Exact locations to be determined during construction.
Garage window glazing putty	Garage Exterior	ACM	300 LF	Exact locations to be determined during construction.

Material	Location	Survey Results	Estimated Quantity of ACM	Comments
Fire door core insulation	Scattered - Throughout	Assumed ACM	12 Unit	Exact locations to be determined during construction.
Stables				
ACM/ASSUMED ACM FINDINGS				
Mud-pack pipe joint insulation with fiberglass covering	Tack Room	ACM	4 Unit	Exact locations to be determined during construction.
	Saddle Repair Room	ACM	15 Unit	
	Blacksmith Shop	ACM	4 Unit	
BESO Complex B1 (Special OPPS) - Occupied Building, due to security aspects Langan was not allowed to perform full confirmatory survey.				
ACM/ASSUMED ACM FINDINGS				
Joint compound to gypsum board	Scattered - Throughout	ACM	15,000 SF	Gypsum board shall be treated and removed as ACM contaminated. Approximately 2,300 square feet of sheetrock was covered with wooden panels, which shall also be removed as asbestos contaminated waste.
Gypsum board and wooden wall panels (ACM contaminated)		Non-ACM		
12x12 tan white floor tiles	Scattered - Throughout	ACM	4,000 SF	Exposed and under raised floor.
Fire door core insulation	Throughout	Assumed ACM	2 Unit	Exact locations to be determined during construction.
BESO Complex B2				
ACM/ASSUMED ACM FINDINGS				
Transite panels	Exterior/Interior Walls/Roof	ACM	17,000 SF	Exact locations to be determined during construction.
BESO Complex B3				
No ACM/ASSUMED ACM was identified within surveyed structure.				
BESO Complex B4				
No ACM/ASSUMED ACM was identified within surveyed structure.				
Kennels B1				
ACM/ASSUMED ACM FINDINGS				
No ACM/ASSUMED ACM was identified within surveyed structure.				
Kennels B2				
ACM/ASSUMED ACM FINDINGS				
No Suspect ACM was identified within surveyed structure.				
Kennels B3				

Material	Location	Survey Results	Estimated Quantity of ACM	Comments
NO SUSPECT ACM WAS IDENTIFIED WITHIN STRUCTURE				
Shooting Range B1				
ACM/ASSUMED ACM FINDINGS				
Fire door core insulation	Throughout	Assumed ACM	8 Unit	Exact locations to be determined during construction.
Shooting Range B2				
ACM/ASSUMED ACM FINDINGS				
Fire door core insulation	Perimeter Wall	Assumed ACM	1 Unit	---
Shooting Range B3				
ACM/ASSUMED ACM FINDINGS				
Fire door core insulation	Throughout	Assumed ACM	3 Unit	---
Shooting Range B4				
NO SUSPECT ACM WAS IDENTIFIED WITHIN THE STRUCTURE				

NOTES:

1. The Main Building is assumed to contain Category I non-friable asbestos containing waterproofing materials (mastic, tar, felt, sealant, etc.) on perimeter structural and masonry components concealed behind the face brick (facades). Category I non-friable ACM which would become friable as a result of demolition activities shall be properly abated prior to structural demolition. All abatement activities shall be performed at no additional cost to the Department. In case if Category I non-friable asbestos containing waterproofing materials are not abated prior to structural demolition, wrecking of the buildings must be performed following safe work practices including but not limited to wet demolition procedures, work areas isolation, use of proper personal protective equipment, dust control, etc. Demolition waste contaminated with asbestos containing waterproofing materials shall be disposed of at a landfill that is permitted to accept asbestos waste.
2. The concealed perimeter structural and masonry components behind the face brick and building foundations were assumed coated with ACM waterproofing materials. Depending upon the application, the magnitude of ACM waterproofing is estimated as follows:

Main Building (Buildings A, B, C, D, E and H)

Buildings Foundations: ~30,000 square feet

Structural and masonry components behind face brick: ~20,000 to 60,000 square feet

(Low end estimate is based on the assumption that the waterproofing would be applied only on spandrel beam, lintels and along the floor slabs. High end estimate is based on the assumption that all perimeter structural components including walls, spandrel beams, etc. are coated with ACM waterproofing).

Pool Area in Main Building - Waterproofing associated with the Pool and its surroundings: ~6,000 square feet

Maintenance Building

Buildings Foundations: ~2,000 square feet

Structural and masonry components behind face brick: ~5,000 square feet

Additional 5,000 square feet of ACM waterproofing should be considered in other concealed spaces which would be discovered during demolition/site activities.

The field estimated quantities is provided as a reference, and therefore, must be used only as a general guidance as to the presence and the order of magnitude of ACM. Concrete and masonry structures contaminated with ACM waterproofing which cannot be segregated shall be disposed off-site at landfills permitted to accept such waste.

3. Also note that if Category I non-friable asbestos containing material is not removed prior to demolition, it may impact on-site recycling of concrete and masonry waste, and the resulting demolition debris that contains ACM materials will need to be properly transported and disposed offsite at a landfill permitted to receive such waste at no additional cost to the Department.
4. The quantities of ACM identified on the asbestos removal drawing and this specification are field estimated, and therefore, shall be used only as a general guidance as to the presence and the order of magnitude of ACM in the buildings.
5. The contractor must assume that all components in direct contact with concealed and exposed ACM/assumed ACM is contaminated and is to be disposed of as ACM-contaminated waste. In lieu of disposing of these materials such, the contractor may opt to decontaminate these components and dispose of them as regular C&D waste, at no additional cost to the Department.
6. In areas where ACM flooring is identified, remove all layers of flooring materials including tiles, covering, plywood, ceramic tiles, bedding mortar, wood/engineered panels, mastic, felt, screed, etc. down to the structural substrate as ACM. The Contractor shall perform necessary demolition including shoring of partition walls to remove concealed ACM floor materials.
7. Abatement and demolition is a combined bid. Abatement sub-contractor must coordinate with the Demolition Contractor for safe removal of concealed ACM.

PART 2 - SCOPE OF WORK

- 2.1 The work for asbestos removal includes all permitting fees; skilled, licensed, and certified, labor; necessary design services; materials; services; insurance; and equipment necessary for the proper preparation, handling, removal, and legal and proper disposal of all ACM and asbestos contaminated waste (ACW) from the work areas as indicated on Contract Drawings.
- 2.2 Whether identified or not, Contractor shall remove and dispose of all ACM impacted by the project activities.
- 2.3 All spaces impacted by the project were inspected during the survey. The Contractor shall access concealed and inaccessible areas including but not limited to chases, crawl spaces and cavities and determine the extent of ACM within the Limits of Work defined.

- 2.4 Within 2 working days of completion of the asbestos removal work, the Contractor shall provide a signed and notarized certificate of completion to the Department for obtaining necessary construction permits.
- 2.5 If ACM is encountered during renovation/demolition operations once the asbestos removal contractor has certified the areas are free of asbestos, the asbestos removal contractor shall re-mobilize within 24 hours of notification and remove ACM encountered during construction.
- 2.6 If the Contractor and/or Subcontractor neglects to carry out activities related to the asbestos abatement work, which could cause endangerment to public health, the Owner may act to correct such deficiencies. In such cases, an appropriate change order will be issued deducting from payment then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Asbestos Consultant's additional services and expenses made necessary by such fault neglect, or failure. If payments then or thereafter due are not sufficient to cover such amounts, the Contractor will pay the difference to the Owner.
- 2.7 Work includes whatever necessary selective demolition and protective measures is required to access and remove ACM and maintain a safe working environment.
- 2.8 The Contractor will be responsible for any damage to neighboring properties. This includes, but is not limited to damage to building components, vehicles, etc.
- 2.9 The quantities and locations of asbestos containing materials quoted herein are provided for information purposes. Langan assumes no responsibility for their accuracy. The Contractor must field verify all information and conditions specified herein and all other project documents
- 2.10 From the start of work through to the project completion, the Contractor shall have on-site a responsible and competent supervisor who possesses valid PADOL Supervisor certifications. The Supervisor shall be on site during all working hours.
- 2.11 Upon completion of the asbestos removal, acceptable final clearance air testing, and breakdown of containments, the Contractor shall provide a notarized abatement completion letter stating that all identified ACM included in the scope of work have been removed from the building in accordance with applicable Federal and State regulations.
- 2.12 The abatement contractor shall hold and document daily pre-abatement safety tool box meeting to review safe work practices and emergency communication program for the project. The abatement contractor's supervisor must also ensure that proper fire extinguishing equipment is present. The supervisor shall be knowledgeable in use of fire extinguishing equipment, and emergency exit plans.
- 2.13 The Contractor must cooperate with the onsite Environmental Consultant and their Project Monitor retained by the Owner and maintain the project schedule. Should the project require final clearance air testing during non-working hours, the supervisor must remain on the site during the sampling.
- 2.14 The Contractor's work plan must clearly identify proper egress at the abatement site and such plan is maintained in the field. The egress conditions must be recorded daily in contractor's on-site log book.
- 2.15 The Contractor must adhere to any and all additional safety requirements imposed by the State and Local departments during the asbestos abatement & demolition.
- 2.16 Temporary facility services including power and water may be available from the buildings for

contractor's use, however, it shall be the contractor's responsibility to provide all temporary connections and hook-ups as well as obtaining permits and paying all fees for making such services available for its work as is necessary.

- 2.17 All air filtration units and vacuums shall have new HEPA filters. Used HEPA filter shall not be permitted.

PART 3 - WORKING CONSTRAINTS AND GENERAL REQUIREMENTS

- 3.1 The Contractor shall protect all utilities including electric, water and sprinkler systems connected to the building.
- 3.2 The Contractor shall provide connections to the Department's utilities as required, including but not limited to electric power, hot and cold water and toilet facilities.
- 3.3 The Contractor shall properly remove all sealed asbestos waste bags from the premises in compliance with Federal and Pennsylvania State rules and regulations.

DIVISION 0300 – DEFINITIONS

PART 1 - GENERAL DEFINITIONS

Definitions contained in this Part are not necessarily complete, but are general to the extent that they may not be defined more explicitly elsewhere in the Contract Documents.

- 1.1 **Containment Zone:** The area(s) as outlined by the Contractor in accordance with Federal, State and local regulation and as approved by the Department which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris and entry by unauthorized personnel for asbestos removal operations.
- 1.2 **Directed:** Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by Department's Representative", "requested by the Department's Representative", and similar phrases. However, no implied meaning shall be interpreted to extend the Department's Representative's responsibility into the Contractor's area of construction supervision and responsibility for adequately performing the work.
- 1.3 **Department's Representative:** An officer of the Department who is in charge of this project.
- 1.4 **Furnish:** The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."
- 1.5 **Inaccessible:** Areas that may contain ACM which are unable to be visually inspected due to physical barriers, asbestos survey limitations or safety concerns.
- 1.6 **Indicated:** This term refers to graphic representations, notes or schedules on the Figures, or other Paragraphs in these Specifications, and similar requirements in Contract Documents. Where terms such as "such", "noted", "schedule", and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

- 1.7 Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations."
- 1.8 Installer: An "Installer" is an entity engaged by the Contractor, either as an employee, subcontractor or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform. The term "experienced", when used with the term "Installer" means meeting the experience requirements of these Specifications, being familiar with the precautions required for the work of this Contract, and while complying with requirements of all authorities having jurisdiction.
- 1.9 Permit: "Permit" shall mean any permit, license, approval, consent or authorization issued by a Federal, State or local governmental or quasi-governmental entity in accordance with any Law or Current Legal Requirement.
- 1.10 Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."
- 1.11 Regulations: The term "regulations" includes codes, laws, statutes, ordinances, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.
- 1.12 Release: "Release" shall mean any releasing, spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, disposing or dumping into the Environment.
- 1.13 Remedial Action: "Remedial action" shall mean all actions as are necessary to put the Premises in the condition required by law.
- 1.14 Remove: The term "remove" includes legal removal, transport and disposal of.
- 1.15 Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests. All testing labs utilized for any asbestos related work shall be NVLAP accredited.
- 1.16 Threat of Release: "Threat of release" shall mean a substantial likelihood of a Release, which requires action to prevent or mitigate damage to the Environment, which may result from such Release.

PART 2 - DEFINITIONS RELATIVE TO ASBESTOS REMOVAL

- 2.1 Accredited or Accreditation (when referring to a person or laboratory): A person or laboratory accredited in accordance with PA DOL Rules and Regulations.
- 2.2 Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- 2.3 Air Cell: Insulation normally used on pipes and duct work that is comprised of corrugated cardboard which can be comprised of asbestos combined with cellulose or refractory binders.
- 2.4 Air Monitoring: The process of measuring the fiber content of a specific volume of air.

- 2.5 Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 dynes or less.
- 2.6 Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.
- 2.7 Asbestos-Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.
- 2.8 Asbestos-Contaminated Waste (ACW): Any material which is or is suspected of being, or any material contaminated with, an asbestos-containing material which is to be removed from a work area for disposal. ACW includes all asbestos contaminated debris as defined by these specifications and applicable regulations.
- 2.9 Authorized Visitor: The Department, the Department's Representative, testing lab personnel, the Professional, emergency personnel or a representative of any Federal, State, and local regulatory or other agency having authority over the project.
- 2.10 Barrier: Any surface that seals off the work area to inhibit the movement of asbestos fibers.
- 2.11 Breathing Zone: A hemisphere forward of the shoulders with a radius of approx 6 to 9 inches.
- 2.12 Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
- 2.13 Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- 2.14 Certified Industrial Hygienist (CIH): An industrial hygienist certified by Comprehensive Practice by the American Board of Industrial Hygiene.
- 2.15 Containment Zone: The area(s) as outlined by the Contractor in accordance with Federal, State and local regulation and as approved by the Department which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris and entry by unauthorized personnel for asbestos removal operations.
- 2.16 Demolition: The wrecking or taking out of any building, or building component, system, finish or assembly of a facility together with any related handling operations.
- 2.17 Disposal Bag: A properly labeled 6-mil-thick (min) leak-tight plastic bag used for transporting asbestos waste from work and to an approved disposal site.
- 2.18 Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.
- 2.19 Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.
- 2.20 Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

- 2.21 Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.
- 2.22 Friable Asbestos Material: Material that contains more than 1% asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
- 2.23 Glovebag: A sack (typically constructed of 6-mil transparent polyethylene or polyvinylchloride plastic) with inward projecting long sleeved gloves, which are design to enclose an object from which an asbestos-containing material is to be removed.
- 2.24 High Efficiency Particulate Air (HEPA) Filter: A filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in diameter.
- 2.25 HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particular air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.
- 2.26 Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- 2.27 Negative Pressure Ventilation System: A pressure differential and ventilation system.
- 2.28 Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discreet surface layer.
- 2.29 Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.
- 2.30 Pressure Differential and Ventilation System: A local exhaust system, utilizing HEPA filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.
- 2.31 Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- 2.32 Removal Encapsulant: A penetrating encapsulant specifically designed to minimize fiber release during removal of asbestos-containing materials rather than for in-situ encapsulation.
- 2.33 Repair: Returning damaged ACM to an undamaged condition or to an intact state so as to prevent fiber release.
- 2.34 Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
- 2.35 Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
- 2.36 Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

- 2.37 Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- 2.38 Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

DIVISION 0400 – SUBMITTALS

PART 1 - GENERAL

- 1.1 The Contractor shall submit to the Department's Representative and the Professional the items listed herein after Notice to Proceed. No asbestos removal work activities shall commence until the listed items are reviewed by the Professional.
- 1.2 Submittal data shall be in sufficient detail to enable the Department and the Professional to identify the particular requirement, work or equipment, and to form an opinion as to its conformity to the Specifications. Each submittal item shall be identified with a cover page and/or transmittal sheet containing the listed submittal number.
- 1.3 The Professional's review of the submittal will be of concept only, and shall not in any way relieve the Contractor's responsibility for the satisfactory performance and completion of the work of this Contract.

PART 2 – SUBMITTALS

- 2.1 SUBMITTAL #1: Prior to the start of work, the Contractor shall prepare and submit a detailed asbestos removal plan. This plan must comply with all applicable Federal, State, and local regulations. No work relative to this Contract shall begin until the Department and Professional has accepted the Contractor's asbestos removal plan. The removal plan shall indicate access and schedule requirements stipulated in the construction documents and by the Department Representative during the pre-bid meeting as well as containment set-ups, decontamination units locations and type, egress/ingress, negative air installation, emergency routes, waste routes and other pertinent information. The acceptance by the Professional of the Contractor's Plan shall not, in any way, relieve the Contractor from any of his/her responsibilities and obligations under this Contract.
- 2.2 SUBMITTAL #2: Provide proposed detailed work schedule including dates, work shift time, number of employees, dates of start and completion including dates of preparation work, removal, final inspection for each area of work.
- 2.3 SUBMITTAL #3: Provides copies of valid Contractor's Asbestos Removal.
- 2.4 SUBMITTAL #4: Name, experience and copies of valid PA licenses of Superintendent/Supervisors.
- 2.5 SUBMITTAL #5: Submit a summary of the Contractor's workforce by disciplines. Include a notarized statement signed by the Contractor documenting that all proposed workers, by name, have received all required medical examinations and have been properly trained and certified in asbestos removal work, respirator use, to appropriate State of Pennsylvania, EPA & OSHA standards for asbestos removal. Include on statement Contractor's compliance with OSHA medical surveillance requirements.
- 2.6 SUBMITTAL #6: Submit notarized certification signed by an officer of the asbestos removal contracting firm that exposure measurements, medical surveillance, and worker training records are being kept in conformance with 29 CFR 1926.
- 2.7 SUBMITTAL #7: Submit a copy of the asbestos removal training certificate and all other required Federal, State and local certifications and/or licensing including, but not limited to, PA DOL Handlers license for each worker.
- 2.8 SUBMITTAL #8: Submit a Plan of Action and Standard Operating Procedures detailing plan of the procedures proposed for use in complying with the requirements of these Specifications. The Plan shall include, but not limited to, distribution of amended water; the sequencing of asbestos work; detailed schedules by dates, shift times, and work activities during that shift; the interface of trades involved in the performance of work; methods to be used to assure the safety of building visitors to the site; and a detailed description of the methods to be employed to control pollution. Plan shall be developed and signed by the Superintendent/Supervisor.
- A. The standard operating procedure shall ensure:
1. Security on a 24 hour basis from unauthorized entry into the work spaces.
 2. Proper protective clothing and respiratory protection prior to entering the work space from the outside.
 3. Safe work practices in the work place, including provisions for inter-room communications; exclusion of eating, drinking, smoking; or use of procedures or equipment that would in any way reduce the effectiveness of respiratory protection or other Professionalizing controls.

4. Proper exit practices from the work space to the outside.
 5. Removing asbestos-containing materials in ways that minimize release of fibers and never allow ACM to drop more than 10 ft.
 6. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimizes or prevents exposure and contamination.
 7. Emergency evacuation of personnel, for medical or safety (fire and smoke) so that exposure will be minimized.
 8. Safety from accidents in the work space, especially from electrical shocks, slippery surfaces, and entanglements in loose hoses and equipment.
 9. Provisions for effective supervision and OSHA-specified personnel air monitoring for exposure during the work.
- 2.9 SUBMITTAL #9: Submit a Contingency Plan for emergencies including fire, flooding, accident, power failure, or any other event that may require modifications or abridgement of decontamination or work area isolation and abatement procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Include telephone number and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, and telephone company.
- 2.10 SUBMITTAL #10: Submit a summary of proposed materials and equipment (manufacturer, catalog number or model, and description) and method of application or use, including, but not limited to: encapsulant, wetting agents, personal protective equipment, and test samples of all proposed materials for performing the work.
- 2.11 SUBMITTAL #11: Submit a plan describing the method for exposure monitoring to document compliance with OSHA Asbestos Standard, including frequency of monitoring, equipment and calibration methods, and name of certified analysis laboratory.
- 2.12 SUBMITTAL #12: Lists and copies of all permits, variances, and licenses, which will be necessarily applied for by the Contractor and obtained and used.
- 2.13 SUBMITTAL #13: Copies of all Federal, State, and local asbestos removal notification forms. Include all certified mailing receipts.
- 2.14 SUBMITTAL #15: Name, location, and applicable licenses for primary and secondary landfill for disposal of asbestos-containing materials or asbestos-contaminated waste.
- 2.15 SUBMITTAL #16: Name and applicable licenses for the asbestos waste hauling company.
- 2.16 SUBMITTAL #17: Submit level of respiratory protection intended for each operation required by the work in accordance with standard Respiratory Protection Program. Include method of determination and compliance with Federal, State and local standards.
- 2.17 SUBMITTAL #19: Certificate of Completion: Following Final Clearance submit written documentation certification signed and notarized by the Contractor that all known and identified ACM have been properly removed and disposed in accordance with applicable Federal and State regulations.
- 2.18 SUBMITTAL #22: After Contract Award and before the start of work, submit insurance certificate naming the Department and other names as requested by the Department as additional insured.

DIVISION 0500 - CODES, REGULATIONS, STANDARDS, AND NOTICES

PART 1 – GENERAL

- 1.1 The Contractor shall be responsible for obtaining and paying required fees for all necessary permits and variances from Federal and State agencies having jurisdiction over this asbestos removal project. Failure on behalf of the Contractor to obtain these permits and variances as required shall not result in any extension of the completion date by Federal, State and local governing agencies set forth in the Contract.
- 1.2 All asbestos containing waste is to be transported in accordance with applicable Federal and Pennsylvania Regulation and as required for transporting these materials to an approved disposal site.
- 1.3 The Contractor shall maintain current licenses as required by applicable Federal, State, and local authorities having jurisdiction for the removal, transporting, disposal or other regulated activity relative to the work of this Contract for the entire length of the Contract.

PART 2 - CODES AND REGULATIONS

- 2.1 General Applicability of Codes and Regulation, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into these Specifications, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the these specifications by reference) as if copied directly into these Specifications, or as if published copies are bound herewith.
- 2.2 Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Department, Department's Representative, and Professional harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of himself, his employees, or his subcontractors.
- 2.3 Federal Requirements which govern asbestos abatement work, hauling and disposal of asbestos include but are not limited to the following:
 - A. OSHA: U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 1. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules
Title 29, Part 1910, Section 1001 and
Part 1926, Section 1101 of the Code of Federal Regulations
 2. Respiratory Protection
Title 29, Part 1910, Section 134 and Part 1926 of
The Code of Federal Regulations

3. Construction Industry
Title 29, Part 1926, section 1101 of the
Code of Federal Regulations
 4. Access to Employee Exposure and Medical Records
Title 29, Part 1910, Section 2 of the
Code of Federal Regulation
 5. Hazard Communication
Title 29, Part 1910, Section 1200 of the
Code of Federal Regulations
 6. Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, Section 145 of the
Code of Federal Regulations
- B. DOT: U.S. Department of Transportation, including but not limited to:
1. Hazardous Substances
Title 29, Part 171 and 172 of the
Code of Federal Regulations
- C. EPA: U.S. Environmental Protection Agency (EPA), including but not limited to:
1. National Emission Standard for Hazardous Air Pollutants (NESHAPS)
National Emission Standard for Asbestos
Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part b)
of the Code of Federal Regulations
 2. Asbestos Abatement Projects Rule
40 CFR Part 762
CPTS 62044, FRL, 2843-9
Federal Register, Vol. 50, No. 134, July 12, 1985 P28530-28540
 3. Regulation for Asbestos
Title 40, Part 61, Sub-part A of the Code of Federal Regulations
- 2.4 State Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:
- A. Pennsylvania Department of Environmental Resource (PA DER)
Bureau of Air Quality Control
 - B. Pennsylvania Department of Environmental Resources (PA DER)
Bureau of Waste Management
 - C. Pennsylvania Department of Labor and Industry

PART 3 – STANDARDS

- 3.1 General Applicability of Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.
- 3.2 Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all standards pertaining to work practices, hauling, disposal, and protection or workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor shall hold the Department and Department's Representative harmless for failure to comply with any applicable standard on the part of himself, his employees, or his subcontractors.
- 3.3 Standards: which apply to asbestos abatement work or hauling and disposal of asbestos waste material include but are not limited to the following:
- A. American National Standards Institute (ANSI)
1430 Broadway
New York, New York 10018
(212) 354-3300
- Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2-79
 - Practices for Respiratory Protection Publication Z88.2-80
- B. American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, PA 19103
(215) 299-5400
- Safety and Health Requirements Relating to Occupational Exposure to Asbestos E 849-82.

PART 4 – NOTICES

- 4.1 The contractor shall be responsible for notifying all applicable governing agencies as required by Federal and State regulations.

Send Written Notifications as to the following agencies at least 10 working prior to beginning of any work:

U.S. Environmental Protection Agency - Region III

- | | |
|--|--|
| 1. Asbestos NESHAPS Contact
Air Management Division
841 Chestnut Street
6th Floor
Philadelphia, PA 19106
(215) 597-6552
(215) 597-3165 (fax) | 2. Pennsylvania Department of Labor & Industry
Asbestos Department, Room 1402
400 Market Street
Harrisburg, PA 17120-8468
(717) 787-9257
(717) 787-8363 (fax) |
|--|--|

- B. The following information shall be included by and sent by the contractor to the NESHAPS contact:
1. Name and address of Department or operator.
 2. Description of the facility being demolished or renovated, including the size, age, and prior use of the facility.
 3. Estimate of the approximate amount of friable asbestos material present in the facility in terms of linear feet of pipe, and surface area on other facility components. For facilities in which the amount of friable asbestos materials less than 80 linear meters (260 linear feet) on pipes and less than 15 square meters (160 square feet) on other facility components, explain techniques of estimation.
 4. Location of the facility being demolished or renovated.
 5. Scheduled starting and completion dates of demolition or renovation.
 6. Nature of planned demolition or renovation and method(s) to be used.
 7. Procedures to be used to comply with the requirements of USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61 Subpart M).
 8. Name and location of the waste disposal site where the friable asbestos waste material will be deposited.
- 4.3 The Contractor shall post all notices required by applicable Federal, State and local regulations. Maintain two copies of applicable Federal, State and local regulations and standards. Maintain one copy of each at the work site. Keep on file in Contractor's office one copy of each.
- 4.4 The Contractor shall notify other entities at the job site of the nature of the asbestos abatement activities, location of asbestos-containing materials, requirements relative to asbestos set forth in these specifications, and applicable regulations. All notification shall first be cleared through the Department's Representative.
- 4.5 The Contractor shall notify emergency service agencies including fire, ambulance, police, or other agency that may service the abatement work site in case of an emergency. Notification is to include methods of entering work area, emergency entry and exit locations, modifications to fire notification or fire fighting equipment, and other information needed by agencies providing emergency services. The Contractor shall clearly post telephone numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, telephone company.

DIVISION 0600 - ASBESTOS REMOVAL EXECUTION

PART 1 – GENERAL

- 1.1 The Contractor shall remove Asbestos Containing Materials (ACM) within the specified work areas as described in Division 0200, Scope of Work.
- 1.2 All work necessary to gain access to ACM shall be performed so as not to disturb the existing ACM.
- 1.3 The Contractor shall demonstrate that his ACM removal and ACW disposal work does not impact in any way the areas beyond the work area. Any contamination of other building areas and materials shall be the sole responsibility of the Contractor. If it is determined by air or surface dust samples that building contamination has occurred as the result of negligence and/or poor work practices of the Contractor, the Contractor shall clean and/or dispose of any contaminated materials at no

additional charge to the Department. The Contractor shall be responsible for any damages claimed or lawsuits brought by persons exposed to such contamination.

- 1.4 Upon completion of the asbestos removal work, the Contractor shall provide appropriate certification to the Department that the work areas are asbestos-free in accordance with Federal, State and local regulations.

PART 2 - ACCESSING INACCESSIBLE AND CONCEALED AREAS

- 1.1 The Contractor shall, in inaccessible and concealed spaces, gain access to these spaces (i.e. pipe chases, plenums, above solid ceilings, etc.) to determine the extent of ACM, if any. The Contractor shall not indiscriminately demolish, but rather, carefully and neatly remove concealing barriers so as to minimize disturbances of potential ACM within and to visually inspect the space behind. The Contractor shall remove all ACM encountered within concealed or inaccessible spaces.
- 2.2 The Contractor shall confirm with the Professional the presence or non-presence of ACM in all inaccessible and concealed areas.

PART 3 - EXISTING MECHANICAL SYSTEMS

- 3.1 The Contractor is alerted that the current operation of existing mechanical systems may be maintained during removal operations. This includes steam, hot water and air transportation systems among others. The Contractor shall take whatever precautions are necessary to protect his/her workers and assure the continual maintenance of the containment barriers from the potential damage of superheated or other conditions that may be encountered during the work.

PART 4 - TEMPORARY FACILITIES

- 4.1 Water or electrical service or both may not be present at the immediate vicinity of the work area. If services are not available, the Contractor shall provide these services as specified herein, and as required by the Department's Representative or as necessary to carry out the work. The extent of these limitations will be discussed further for each phase at the pre-bid meeting and/or pre-construction meetings. Locate temporary services and facilities where they will serve the work area adequately and result in minimum interference with the performance of the work. Relocate, modify, and extend services and facilities as required during the course of work so as to accommodate the work of this Contract.
 - A. The Contractor shall provide new or used materials and equipment that are undamaged and in serviceable condition and provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
 - B. The Contractor shall provide all scaffolding, ladders and/or staging, etc. as necessary to accomplish the work of this contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding shall comply with all applicable OSHA provisions. Equip rungs of all metal ladders, etc. with an abrasive non-slip surface. Provide a nonskid surface on all scaffold surfaces subject to foot traffic.
 - C. Water Service

1. Temporary Water Service Connection: All connections to the building water system shall include backflow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
2. Water Hoses: Employ heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or sprouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
3. Hot Water: may be secured from the building hot water system, if operable provided backflow protection is installed at point of connection as described in this section under Temporary Water Service convection, and if authorized in writing by the Department's Representative.
4. Maintain hose connections and outlet valves in leak-proof condition. Where finish work below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize the possibility of water damage. Drain water promptly from pans as it accumulates.

D. Electrical Service

1. General: Comply with applicable NEMA, NECA and UL standards and governing regulations and codes for materials and layout of temporary electric service. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.
2. Temporary Power: Provide service with fused disconnect connected to the buildings main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work.
3. Voltage Differences: Provide identification warning signs at power outlets which are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.
4. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type GFCI equipped with test button and reset switch for all circuits to be used for any purpose in work area, decontamination units, exterior, or as otherwise required by national electrical code, OSHA or other authority. Locate in panel exterior to Work Area.
5. Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single length or use waterproof connectors to connect separate lengths of electric cords, if single lengths will to reach areas of work.

6. Lamps and Light Fixtures: Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work or this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.
7. Lockout: Lockout all existing power to or through the work area as described below. Unless specifically noted otherwise existing power and lighting circuits to the Work Area are not to be used. All power and lighting to the Work Area and Decontamination facilities are to be provided from temporary electrical panel described below.
 - a. Lockout power to Work Area by switching off all breakers serving power or lighting circuits in work area. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Lock panel and have all keys under control of Contractor's Superintendent or Department's designated Representative.
 - b. Lockout power to circuits running through Work Area wherever possible by switching off all breakers serving these circuits. Label breakers with tape over breaker with notation "DANGER circuit being worked on". Sign and date danger tag. Lock panel and supply keys to Contractor and Department's Representative. If circuits cannot be shut done for any reason, label at intervals 4'-0" on center with tags reading, "DANGER live electric circuit. Electrocution hazard."
8. Temporary Electrical Panel: Provide temporary electrical panel sized and equipped to accommodate all electrical equipment and lighting required by the work. Connect temporary panel to existing building electrical system. Protect with circuit breaker or fused disconnect. Locate temporary panel as directed by Department's Representative.
9. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be at least exposed to damage from construction operations.
10. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) or proper size located in the temporary panel. Do not use outlet type GFCI devices.
11. Temporary Wiring: Department will provide temporary power supply to Contractor's GFI panel.
12. Number of Branch Circuits: Provide sufficient branch circuits as required by the work. All branch circuits are to originate at temporary electrical panel. At minimum provide the following:
 - a. One Circuit for each HEPA filtered fan unit.
 - b. For power tools and task lighting, provide one temporary 4-gang outlet in the following locations. Provide a separate 110-120 Volt, 20 Amp circuit for each 4-gang outlet (4 outlets per circuit).
 - c. One outlet in the work area for each 2500 square feet of work area. One outlet at each decontamination unit, located in equipment room.

13. Lockout: Lock out all existing power to lighting circuits in Work Area. Unless specifically noted otherwise existing lighting circuits to the Work Area are not to be used. All lighting to the Work Area and Decontamination facilities is to be provided from temporary electrical panel described above.
 14. Provide the following or equivalent where natural lighting or existing building lighting does not meet the required light level:
 - a. One 200-watt incandescent lamp per 1000 square feet of floor area, uniformly distributed, for general construction lighting, or equivalent illumination of a similar nature. In corridors and similar traffic areas provide one 100-watt incandescent lamp every 50 feet. In stairways and at ladder runs, provide one lamp minimum per story, located to illuminate each landing and flight. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting.
 15. Provide lighting in areas where work is being performed as required to supply a 100 foot candle minimum light level.
 16. Provide lighting in any area being subjected to a visual inspection as required to supply a 100 foot candle minimum light level.
 17. Number of Lighting Circuits: Provide sufficient lighting circuits as required by the work. All lighting circuits are to originate as temporary electrical panel.
 18. Circuit Protection: Protect each circuit with a ground fault circuit interrupter (GFCI) or proper size located in the temporary panel.
 19. Provide sampling equipment for use by the Professional including but not limited to High Volume pumps, extension cords, stands, air flow tube, leaf blower, fans, etc. to perform during and post abatement air sampling. Professional will not be responsible for any damage to sampling supplies provided by the Contractor.
- E. First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry.
- F. Fire Extinguisher: Provide Type "A" fire extinguisher for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguisher, or a combination of several extinguisher, or a combination of several extinguisher of NFPA recommended types for the exposures in each case.
- G. Scaffolding
1. During the erection and/or moving of the asbestos removal contractor's scaffolding, care must be exercised so that the polyethylene floor covering is not damaged. Clean as necessary debris from non-slip surfaces.
 2. At the completion of abatement work clean all construction aids within the work area, wrap in one layer of 6 mil polyethylene sheet and seal before removal from the work area.
- H. Installation, General

1. General: Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the work.
2. Require that tradesmen accomplishing this work be licensed as required by local authority for the work performed. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.

PART 5 - TEMPORARY AIR CIRCULATION SYSTEM

5.1 HEPA Filtered Fan Units

- A. General: Supply the required number of HEPA filtered fan units to the site in accordance with these specifications.
- B. Cabinet: Construction of durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Provide units whose cabinets are:
 1. Factory-sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance.
 2. Arranged to provide access to and replacement of all air filters from intake end.
 3. Mounted on casters or wheels.
- C. Fans: Rate capacity of fan according to usable air-moving capacity under actual operating conditions.
- D. HEPA Filter: Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
 1. Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
 2. Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 μm dioctylphthalate (DOP) particles when tested in accordance with Military Standard Number 282 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL 586 label to indicate ability to perform under specified conditions.
 3. Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
- E. Prefilters: which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of prefiltration are required. Provide units with the following prefilters:
 1. First-stage prefilter: low-efficiency type (e.g., for particles 100 μm and larger)

2. Second-stage (or intermediate) filter: medium efficiency (e.g., effective for particles down to 5 μm)
- F. Provide units with prefilters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.
- G. Instrumentation: Provide units equipped with:
1. Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed.
 2. A table indicating the usable air-handling capacity for various static pressure reading on the Magnehelic gauge affixed near the gauge for referenced, or the Magnehelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CPB) air delivery at that point.
 3. Elapsed time meter to show the total accumulated hours of operation.
- H. Safety and Warning Devices: Provide units with the following safety and warning services:
1. Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter.
 2. Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
 3. Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading) (yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge) (red).
 4. Audible alarm if unit shuts down due to operation of safety systems.
- I. Electrical components: Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment. The motor, fan, fan housing, and cabinet are to be grounded.
- J. Install air filtration device in the immediate vicinity of the work area. The required number of units would provide air circulation within the work area.
1. Mount units to exhaust directly or through disposable ductwork.
 2. Use only new ductwork except for sheet metal connections and elbows.
 3. Use ductwork and fittings of same diameter or larger than discharge connection on fan unit.
 4. Use inflatable, disposable plastic ductwork in lengths not greater than 100 feet.
 5. Use spiral wire-reinforced flex duct in lengths not greater than 50 feet.
 6. Arrange exhaust as required to inflate duct to a rigidity sufficient to prevent flapping.

7. Locate HEPA filtered negative pressure ventilation equipment within work area. Fabricate a manifold as required to distribute air to individual spaces to be isolated.
- K. Air Circulation: For purposes of this section air circulation refers to either the introduction of outside air to the work area or the circulation and cleaning of air within the containment zone.

PART 6 - DECONTAMINATION UNITS

- 6.1 Arrange containment zones and decontamination units so that the majority of make up air comes through the Decontamination Units. Use only personnel or equipment Decontamination Unit at any time and seal the other so that make up air passes through unit in use. The decontamination unit shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by airlocks and from the work area by a lockable, shuttered door.

PART 7 - PERSONNEL PROTECTION

7.1 Protective Clothing

- A. Coveralls: Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area.
- B. Boots: Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Paint uppers of all boots red with water proof enamel. Do not allow boots to be removed from the work area for any reason, after being contaminated with asbestos containing material. Dispose of boots as ACW at the end of the work or seal in 6-mil poly bags (with labels) for transportation to another work area.
- C. Goggles: Provided protection (goggles as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury. Goggles are not required if full face respiratory protection is used.
- D. Gloves: Provide work gloves to all workers and require that they be worn at all times in the work area. Do not remove gloves from work area and dispose of as ACW at the end of the work.
- E. Hard Hats: Provide hard hats to all workers and authorized visitors and require that they be worn at all times in the Work Area. Hard hats shall be worn over the hood of the coveralls.

7.2 Respiratory Protection

- A. The Contractor shall provide all workers, foremen, superintendents, authorized visitors, and inspectors personally - issued and marked respiratory protective equipment approved by NIOSH and OSHA. When respirators with disposal filters are employed, the Contractor shall provide sufficient filters for replacement as necessary by the worker or authorized visitor. Filters shall be disposed of as contaminated waste.
- B. Instruct and train each worker involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials in proper respiratory use and require that each worker

always wear a respirator, properly fitted on the face in the work area from the start of any operation which may cause airborne asbestos fibers until the work area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.

- C. Respiratory protection required for any abatement activity shall initially be based on exposure levels within the work area. At a minimum, half-face air purifying respirators shall be used for any asbestos removal activity. All respiratory protection shall, as a minimum, meet all requirements of all applicable regulations.

- 1. Using the OSHA exposure limit of 0.1 f/cc over an 8-hour TWA and the protection factor assigned to each respirator type, the following table shall be used in the Contractor's selection of appropriate respirators.

Airborne Concentration of Asbestos, Tremolite, Anthophyllite, Actinolite, or a Combination of these Minerals

<u>Fiber Concentrations</u>	<u>Required Respirator</u>
Not in excess of 0.1 f/cc.	Half-mask air-purifying respirator equipped with high-efficiency HEPA filters.
Not in excess of 2.0 f/cc.	Full face piece air-purifying respirator equipped with high-efficiency filters.
Not in excess of 10.0 f/cc.	Full face piece Type C supplied-air respirator operated in pressure demand mode.
Greater than 10.0 f/cc.	Full face piece Type C supplied air respirator operated in demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus.

- 2. Contractors shall choose respirator types that, as a minimum, provide protection factors equal to those required above based on exposure levels.
 - 3. Single-use, disposable respirators shall not be permitted or allowed on the work site.
 - 4. Half- of Full-Face Air Purifying Respirators shall only be worn by personnel when approved by a physician, and after a quantitative or qualitative fit test is performed by an experienced industrial hygienist pursuant to OSHA regulations. Personnel that have not been fit-tested, or have failed the fir test, shall use (at a minimum) powered air purifying respirators at all times.
- C. Respiratory protection as specified herein shall be worn at all times, including preparation of the work areas, loading and unloading of waste containers in the work area or at the transport truck, cleaning of work areas, and performance of glove bag removal work.
- E. Facial hairs such as beards, long sideburns, and moustaches which could interfere with the seal of air purifying type respirators shall not be allowed.
- F. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:

1. Respiratory protection shall be inspected and decontaminated on a daily shift basis in accordance with OSHA 29 CFR 1910. 134(b);
2. HEPA filters for negative pressure air filtering respirators shall be changed after each 8-hour shift;
3. Respirators shall be stored in a dry place and in such a manner that the face piece and exhalation valves are not distorted;
4. Organic solvents shall not be used for washing of respirators;
5. Whenever respirator design permits, workers shall perform a positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow (using the methods specified by the manufacturer) every four hours of use and each time the worker enters or exits the work area. Written logs of these tests shall be maintained by the Contractor.

PART 8 - MATERIALS, TOOLS, AND EQUIPMENT

8.1 General

- A. The Contractor shall deliver all materials and equipment to the site in the original containers bearing the name of the manufacturer, and details for proper storage and usage.
- B. All materials or equipment delivered to the site shall be unloaded, temporarily stored, and transferred to the work area in a manner which shall not interfere with building operations.
- C. Unloading and temporary storage sites, and transfer routes, will be designated by the Department's Representative during the pre-bid meeting.
- D. Damaged or deteriorated materials may not be used and must be promptly removed from the premises. Material which becomes contaminated with asbestos-containing material shall be packaged and legally disposed of in an approved, secure landfill.
- E. All materials, tools and equipment must comply, at a minimum, with this specification, and relevant Federal, State, and Local regulations.

8.2 Respirator Protection Equipment

- A. Respirator Bodies: Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit.
- A. Filter Cartridges: Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA Certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI 2228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification. The approved filters must conform to

the following classification: N100 & R100 & P100 with a minimum efficiency level of 99.97%. The P100 filters for asbestos activities are to be color-coded magenta.

C. Non-permitted Respirators: Do not use single use, disposable or quarter face respirators.

- 8.3 Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mils thick as required, frosted or black as indicated.
- 8.4 Duct Tape: Provide duct tape in 2 inch or 3 inch widths as indicated, with an adhesive which is formulated to aggressively stick to sheet polyethylene.
- 85 Waste Containers: Provide 6-mil-thick leak-tight polyethylene bags labeled with two labels with text as follows:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

If the waste material contains sharp edges or may otherwise puncture polyethylene bags, provide properly labeled drums-or other closed containers for storage, transportation, and disposal.

- 8.6 Warning Signs and Labels - Shall comply with 29 CFR 1926.1101, and all other federal, state, or local codes and regulations.
- 8.7 Ladders or Scaffolds - Shall be OSHA-approved, and be of sufficient dimensions and quantities so that all work surfaces can be easily and safely accessed by the Professional, workers, and other inspectors. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos fibers.
- 8.8 Hand Power Tools - Shall be equipped with HEPA-filtered local exhaust ventilation if used to drill, cut into, or otherwise disturb ACM.
- 8.9 Two Way Radios - Provide General Superintendent and all Work Area Supervisors and Foremen with compatible two-way radios.
- 8.10 Provide necessary sampling equipment and supplies including but not limited to pumps, GFCI, extension cords, stands, leaf blower, fans, etc. for Department's representative to perform post abatement final clearance air testing.

PART 10 – WORK AREA PREPARATION

10.1. The work area preparation shall apply to all major asbestos projects.

- A. The building Department or designated representative shall provide at least ten (10) calendar days advance notification of intended asbestos abatement activity to all occupants within the work area and areas adjacent to the asbestos project. The notification shall include: the name of the contractor, the project location and scope, amount and type of asbestos, abatement procedure, dates of expected occurrence, and the telephone number for Air Management

Services. Postings of this notification shall be in English (and other languages appropriate to the population of occupants within the work area and adjacent areas), at eye level, in a conspicuous, well-lit place, at the entrances to the work area and immediate adjacent areas. The notice shall have the heading, NOTICE OF ASBESTOS ABATEMENT, in a minimum of one-inch Sans Serif gothic or block style lettering. All other lettering shall be in a minimum of one-quarter inch Sans Serif gothic or block style. The notice shall be posted until the Department certifies that the re-occupancy standard has been met.

- B. Caution signs meeting the specifications of OSHA 29 CFR 1926.1101, shall be posted at all entrances to a location where airborne concentrations of asbestos may exceed ambient background levels. Caution signs shall be posted in English and other appropriate languages.
- C. Occupants shall be removed from any floor where an asbestos project is in progress, unless the work area is completely separated from the occupied area either by an airtight physical barrier, such as a wall, or by an isolation barrier, with the work area under negative pressure.
- D. When an isolation barrier is required it shall be constructed as follows:
 - 1. Partitions shall be constructed of, at a minimum, conventional 2x3 wood, polyvinyl chloride piping, or metal stud framing or equivalent, on a sixteen inch maximum center-to-center (16"CC) to support barriers in all openings larger than thirty-two (32) square feet, except where any one dimension is one (1) foot or less;
 - 2. A solid construction material (e.g., plywood) of at least three-eighths-inch (3/8") thickness shall be applied to the work side of the framing where the barrier could be subject to damage from activity adjacent to the work area;
 - 3. The partition shall be plasticized as identified below;
 - 4. All accessible walls surrounding the area shall contain a minimum 18" square transparent viewing port made of shatterproof material greater than or equal to 0.125" in thickness located at a height appropriate for accessible viewing and in such a manner so as to maximize visibility of the work area. Viewing ports shall be maintained in a clear and unobstructed manner at all times.
- E. Prior to erection of partitions, asbestos materials that will be disturbed during this activity shall be:
 - 1. Treated first with amended water or a removal encapsulant;
 - 2. Remove using a tent procedure or by an equivalent procedure approved by the AMS. Removal by these procedures shall be limited to a maximum of a one (1)-foot-wide strip running the length and/or height of the partition and is allowed only to facilitate erection of the partitions.
- F. Prior to plasticizing the work area:
 - 1. Movable objects within the proposed work areas shall be pre-cleaned using HEPA-filtered vacuum equipment and, where feasible, wet cleaning methods, and such objects shall be removed from the work area. Upholstered furniture, carpeting and drapes shall HEPA-vacuumed before removal from the work area. If carpeting is left in place, it shall be covered with plastic sheeting and one half (1/2)-inch rigid flooring prior to

plasticizing.

2. Fixed objects which will remain within the proposed work areas shall be pre-cleaned using HEPA-filtered vacuum equipment and, where feasible, wet cleaning methods and enclosed with one (1) layer of plastic sheeting sealed with tape; and
 3. All other surfaces in the proposed work areas shall be pre-cleaned using HEPA-filtered vacuuming equipment.
- G. Except to allow for the entry of air necessary to maintain negative pressure, the work area shall be isolated by completely enclosing the work area and sealing off all doors, windows, ducts, grills, diffusers, and any other penetrations of the work areas with two (2) layers of plastic sheeting and tape. All seams of system components that pass through the work area shall also be sealed.
- H. After the isolation barriers required in paragraph 4. above have been erected, ceiling-mounted objects not previously sealed, that will interfere with the asbestos abatement project, shall be removed and cleaned. Amended water spraying or HEPA-filtered vacuuming shall be used during the process of removing any ceiling-mounted objects to reduce the dispersal of asbestos fibers.
- I. Suspended ceiling tiles and T-grid components contaminated by friable asbestos materials shall remain in place until:
1. The work area has been fully prepared as per the Regulations; and
 2. Electrical and HVAC systems have been shut down.
- J. Emergency exits from the work areas shall be maintained, or alternative exits shall be maintained in accordance with any applicable provisions. Emergency exits shall be checked daily against exterior blockage or impediments to exiting.
- K. Entrances to the work area that will not be used for worker entry or emergency exits shall be locked to prevent unauthorized entry.
- L. Floor drains shall be sealed individually with two layers of plastic sheeting and tape. Pits, sumps, etc., shall be covered with adequate plywood sheeting and secured to floor slabs in a manner which prevents a tripping hazard, prior to plasticizing as required.
- M. Elevators running through the work area shall be shutdown, except as provided in subdivision b. of this paragraph:
1. The elevator door in the work area shall be enclosed with conventional 2x3 stud framing, covered with three-eighths-inch (3/8") plywood sheathing and sealed at all edges and seams. This barrier shall be covered and lapped for eight (8) inches with two (2) layers of plastic sheeting adhered individually with edges taped for air tightness; and
 2. Elevators may remain in operation where shut-down would severely restrict usage of the remainder of the occupied building. In these situations:
 - I. Elevator control shall be modified to bypass the work area, if possible;

- II. A final larger layer of plastic sheeting shall be taped across the opening, airtight but with slack forming a larger perimeter diaphragm. Air leakage across the barrier shall be corrected upon discovery, and the elevator shaft shall be checked for airborne asbestos contamination; and
 - III. Smoke tests shall be conducted daily by the independent certified project inspector.
- N. Heating, cooling, and ventilating air systems into or out of the work area shall be shut down to prevent contamination and dispersal of asbestos fibers to other areas of the structure.
- O. Electrical power shall be shut down, tagged, and locked out to all work areas, except to those work areas where it is necessary that electrical equipment remain in service. Safe, temporary power and lighting that are waterproof, when applicable, shall be provided in accordance with any applicable provisions. All power to work areas shall be brought in from outside the area through ground-fault interrupter at the source. Necessary stationary electrical equipment within the work area shall be adequately enclosed and ventilated.
- P. A worker decontamination enclosure system shall be installed or constructed prior to plasticizing the work area and before disturbing asbestos material. The area in which these systems are located shall require heating, ventilating and air-conditioning system isolation, and plasticizing of electrical outlets and equipment.
- Q. All floor and wall surfaces shall be covered and sealed with plastic sheeting, using a minimum of two (2) layers. The plastic layers on the floor shall extend twelve (12) inches up the walls. Walls shall be covered with plastic sheeting down to the floor level, thus overlapping the floor covering by a minimum of twelve (12) inches. There shall be a distance of at least twelve (12) inches between the seams of adjacent layers.

PART 11 – ABATEMENT PROCEDURES

11.1. General ACM disturbance, handling and removal Procedures

- A. No removal of asbestos materials may begin until the Department has performed a pre-inspection of the work area to ensure that the work area has been properly prepared and that all necessary equipment is in place to protect building occupants and the general public;
- B. No person shall enter the work area during an asbestos project without proper equipment and clothing and training;
- C. The contractor or supervisor of an asbestos project shall provide all authorized persons who enter the work area with the required protective clothing and equipment, in accordance with applicable federal regulations, including disposable protective clothing (including full-body coveralls, head and foot covers, gloves) and appropriate respirators;
- D. The contractor or supervisor of an asbestos project shall ensure that:
 - 1. All individuals refrain from eating, drinking, and smoking in the work area and other contaminated areas;

2. All workers and authorized visitors enter the work area through the worker decontamination enclosure system;
 3. All individuals who enter the work area sign an entry log, located in the clean room, upon each entry and exit. The pages of the log shall be permanently bound together and shall identify fully the facility, Department, agents, contractor(s), the project, each work area, worker respiratory protection employed, and date and time of entry and exit. The entry log headings shall indicate, and the signatures shall be used to acknowledge, that the regulations and procedures have been reviewed and understood by all persons prior to entering the work area. The postings and log headings shall be in English and other appropriate languages. The asbestos project supervisor shall be responsible for the maintenance of the log during the abatement activity. The log shall be available for examination during general business hours by the Department, the Department and the project workers;
 4. All individuals, before entering the work area, are familiar with all posted regulations, personal protection requirements and emergency procedures;
 5. All individuals proceed first to the clean room, remove all street clothing, store these items in clean, sealable plastic bags or a locker, and don respiratory protection, disposable coveralls, head covering, foot covering and gloves. Clean respirators, filters, if appropriate, and protective clothing shall be provided and utilized by each person on each occasion when he/she enters the work area;
 6. Individuals wearing the designated personal protective clothing and equipment proceed from the clean room, through the shower room, to the equipment room where necessary tools are collected and any additional clothing (deck shoes, hard hats, goggles and/or overalls) are donned before entry into the work area;
 7. Before leaving the work area, each individual removes the gross contamination from the outside of the respirators and protective clothing by wet cleaning and/or HEPA-filtered vacuuming;
 8. In the equipment room, all personal protective equipment, except respirators, shall be removed; disposable clothing shall be deposited into the appropriate containers for disposal. Reusable contaminated clothing, footwear, and/or head gear shall be stored in the equipment room when not in use;
 9. Each individual, while still wearing a respirator, proceeds to the shower room, cleans the outside of the respirator and his/her exposed face area under running water prior to removing the respirator, and then fully and vigorously showers and shampoos to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Various types of respirators may require slight modification of these procedures; and
 10. Individuals, after showering and drying, proceed to the clean room and don clean disposable clothing if returning to the work area or, if not, street clothing.
- E. The asbestos material shall be sprayed with amended water. The amended water shall be tested on a small area before use to ensure effectiveness. A fine low-pressure spray of amended water shall be applied to prevent disturbance of asbestos fibers prior to removal. The amended water shall be sprayed on as many times and as often as necessary ensure that the asbestos nearest the substrate the asbestos material is thoroughly wetted to event

dust emission. Removal of dry asbestos material shall be permitted only when removal of wet asbestos material is not feasible and only with the prior approval of the Department;

- F. Asbestos material located more than fifteen (15) feet above the floor shall be removed and lowered into inclined chutes, lowered onto scaffolding, or containerized at that height for later disposal. Asbestos materials shall not be dropped or thrown to the floor from fifteen (15) feet or greater. For materials at heights greater than forty (40) feet above the floor, a dust-tight, enclosed chute shall be constructed to transport removed asbestos material directly to containers located on the floor;
- H. After all of the asbestos material has been removed from the structure, all surfaces from which asbestos has been removed shall be scrubbed using nylon or bristle brushes and wet-sponged, or cleaned by an equivalent method approved by the Department, to remove all visible asbestos material. During cleaning the surfaces shall be kept wet using amended water;
- I. All accessory equipment shall be moved to the equipment room in sealed six (6)-mil plastic bags and decontaminated for removal;
- J. All free water (in contaminated areas) shall be retrieved and added to asbestos waste for disposal and/or placed in plastic-lined leak-tight drums for disposal.
- K. Containment-bag techniques shall be used to the maximum extent feasible for removal of asbestos pipe insulation or other appropriate asbestos materials.

11.2. Tent procedures

- A. Removal procedures shall be conducted as follows:
- B. Tent procedures shall be used only as part of work area preparation before erection of isolation barrier partitions that would disturb asbestos materials.
- C. Use of tent procedures shall be limited to the removal of less than one hundred sixty (160) square feet of asbestos material;
- D. Tent procedures shall be accomplished in a constructed or commercially available plastic tent, plasticizing and sealing all surfaces not being abated within the tent periphery forming an enclosure. The tent shall be of six (6)-mil polyvinyl chloride at a minimum, with seams heat-sealed or double folded, stapled and taped air-tight and then taped flush with the adjacent tent wall. This is a single use barrier that shall not be reused once dismantled or collapsed;
- E. All tent enclosures and contiguous spaces within a radius of 10 feet shall be roped off and regulated to allow only certified workers and authorized visitors to enter.
- F. Asbestos workers involved in the tent procedure shall wear two (2) disposable suits, including gloves, hood and footwear, and appropriate respiratory equipment if a decontamination unit is not contiguous to the tent;
- G. The tent shall be attached to the substrate to produce an airtight seal except for a section large enough to allow for make-up air into the tent;

- H. An air filtration unit shall be used to continuously exhaust the enclosed area to maintain negative pressure. Negative pressure shall be tested by smoke testing. The duct shall be attached securely and airtight through the tent wall at the most remote location possible from the asbestos material to be disturbed. A minimum of two (2) volume changes per hour is required;
- I. Removal of asbestos material shall be by wet methods;
- J. The removed asbestos material shall be carefully placed in plastic disposal bags;
- K. Upon completion of abatement, and prior to tent collapse, the enclosed substrates shall:
 - 1. be wet cleaned using clean rags, mops or sponges;
 - 2. be permitted sufficient time to dry, prior to EPA-vacuuming all substrates; and
 - 3. be encapsulated to lockdown residual asbestos;
- L. In the event of loss of negative pressure or barrier disturbance, the tent and the enclosed substrates shall be treated according to subdivision h. above;
- M. The outer disposable suit shall be removed and remain in the tent upon exiting. Following tent disposal and work site cleanup the workers shall immediately proceed to a shower at the work site. The inner disposable suit and respirator shall be removed in the shower after appropriate wetting. The disposable clothing shall be disposed of as asbestos waste material. The workers shall then fully and vigorously shower with supplied liquid bath soap, shampoo, and clean, dry towels;
- N. The HEPA vacuum shall be used to filter a minimum of six (6) volume changes through the tent prior to collapse of the tent/barrier; and
- O. The tent shall be collapsed inward, enclosing the contaminated clothing. This contaminated material shall be disposed of in a plastic disposal bag. The vacuum shall be decontaminated and sealed.

11.3. Containment-Bag Technique

- A. The removal of asbestos by use of the containment-bag technique shall be limited to asbestos insulation from pipe fittings, elbows, and pipe. Containment bags are for single use and shall not be repositioned;
- B. A minimum of two persons are required to perform asbestos material removal by the containment-bag technique. A third person may be required to conduct air monitoring and assist with supplies;
- C. Work areas where removal of asbestos materials is performed solely by the containment-bag technique shall be prepared as follows:
 - 1. Notification of asbestos abatement and caution signs shall be posted.
 - 2. All necessary materials and supplies shall be brought into the work area before any removal begins;

3. Building occupants shall be removed from any floor where a removal project is in progress unless the work area is completely separated by an airtight physical barrier such as a wall, or by an isolation barrier;
4. The work area shall be separated from the rest of the work site by isolation barriers consisting of solid physical barriers such as ceiling, floors, and walls, or solid partitions, with all openings such as doors, windows, and air vents covered with a single layer of plastic sheeting;
5. At least one layer of plastic sheeting shall be taped to the floor beneath the pipes subject to the abatement extending at least five (5) feet from the area of removal in all directions; and

D. Removal procedures shall be conducted as follows:

1. A visual inspection of the pipe where the work will be performed shall be made to determine if any damaged pipe covering (broken lagging, hanging etc.) exists. If so, the pipe shall be wrapped in polyethylene and fully secured with duct tape. Debris on the floor and other surfaces which has accumulated and contains asbestos must be properly disposed. If the pipe is undamaged, one layer of duct tape shall be placed around the pipe at each end of where the containment bag will be attached. The pipe insulation diameter worked shall not exceed one half the bag working length above the attached gloves;
2. Slit the top of the containment bag open (if necessary) and cut down the sides to accommodate the size of the pipe (about two inches longer than the pipe diameter);
3. Place the necessary tools into the pouch located inside the containment bag. This will usually include the bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and pre-cut wettable cloth.
4. Cut out two (2) doughnut shapes in the cloth with the inner diameter one half inch smaller than the diameter of the pipe beneath the insulation. Finally, cut a slit in each of the two doughnuts so they can be slipped around the pipe;
5. One strip of duct tape shall be placed along the edge of the open top slit of the containment bag for reinforcement;
6. Place the containment bag around the section of pipe to be worked on and staple the top together through the reinforcing duct tape. Staple at intervals of approximately one inch. Next, fold the stapled top flap back and tape it down with a strip of duct tape. Next, duct tape the ends of the containment bag to the pipe itself, previously covered with plastic or duct tape;
7. Using the smoke tube and aspirator bulb, place the tube into the water sleeve (two-inch opening to containment bag). By squeezing the bulb, fill the bag with visible smoke. Remove the smoke tube and twist the water sleeve closed. While holding the water sleeve tightly, gently squeeze the containment bag and look for smoke leaking out, especially at the top and ends of the containment bag. If leaks are found, they shall be taped closed using duct tape and the bag shall be re-tested;
8. Insert the wand from the water sprayer through the water sleeve. Using duct tape, tape

the water sleeve tightly around the wand to prevent leakage;

9. One person places their hands into the long-sleeved gloves while the second directs the water spray at the work;
10. If the section of pipe is covered with an aluminum jacket, this is removed first using wire cutters to cut any bands and tin snips to remove the aluminum. It is important to fold the sharp edges in to prevent cutting the bag when it is placed in the bottom. A box may be put in the bottom of the bag with the tools placed in it, and the metal placed in the box to further protect the bag from being cut;
11. With the insulation exposed, using a bone saw, cut the insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, water is sprayed on the cutting area to keep dust to a minimum;
12. Once the ends are cut, the section of insulation should be slit from end to end using a utility knife. The cut should be made along the bottom of the pipe and water continuously supplied. Again, care should be taken when using the knife not to puncture the bag. Some insulation may have wire to be clipped as well. Again, a box may be used to protect the bag from puncture;
13. Rinse all tools with water inside the bag and place back into pouch;
14. The insulation can now be lifted off the pipe and gently placed in the bottom of the bag, while the side of the insulation adjacent to the pipe is being thoroughly wetted;
15. Using a scrub brush, rags, and water, scrub and wipe down the exposed pipe;
16. Wet the doughnut-shaped pieces of wettable cloth over the exposed ends of insulation remaining on the pipe;
17. Remove the water wand from the water sleeve and attach the small nozzle from the HEPA-filtered vacuum. Turn on the vacuum only briefly to collapse the bag;
18. Remove the vacuum nozzle and twist the water sleeve closed and seal with duct tape;
19. From outside the bag, pull the tool pouch away from the back. Place duct tape over the twisted portion and then cut the tool bag from the containment bag, cutting through the twisted/taped section. In this
20. Manner, the contaminated tools may be placed directly into the next containment bag without cleaning. Alternatively, the tool pouch with the tools can be placed in a bucket of water, opened underwater, and the tools cleaned and dried without releasing asbestos into the air. Rags and the scrub brush cannot be cleaned in this manner and should be discarded with the asbestos waste;
21. With removed insulation in the bottom of the bag, twist the bag several times and tape it to keep the material in the bottom during removal of the containment bag from the pipe;
22. Slip a six (6)-mil disposal bag over the containment bag (still attached to the pipe). Remove the tape and open the top of the containment bag and fold it down into the

disposal bag;

23. All surfaces in the work area shall be cleaned in accordance with the Regulations.
24. Place any contaminated articles, debris, etc. into the bag with the waste;
25. Twist the top of the bag closed, fold this over, and seal with duct tape. Place this bag into a second six (6)-mil disposable bag, and seal as in the above manner. Label the bag with a warning label;
26. Asbestos material shall be disposed of in accordance with the Regulations; and
27. Only containment bags which are manufactured and designed to be used exclusively on vertical pipe shall be used on vertical sections of pipe.

PART 12 - ASBESTOS-CONTAINING MATERIALS AND WASTE DISPOSAL

- 12.1 The Contractor shall package, label, and remove all asbestos waste from the work area in accordance with PADOL regulations, all other applicable regulations, and as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. The Contractor shall transport and dispose of the containerized waste in accordance with applicable federal and state regulations in certified vehicles at an approved landfill.
- 12.2 Asbestos wastes may include building materials, insulation, disposable clothing and protective equipment, plastic sheeting and tape, exhaust systems or vacuum filters, contractor equipment, or other materials designated by state or local authorities or the Professional which have been potentially contaminated with asbestos and have not been fully cleaned.
- 12.3 Waste Labeling:
 - A. Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA and Department of Transportation requirements, shall be affixed to or printed on the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible, and contain the following words:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**
 - B. In compliance with NESHAPS, 40 CFR, Part 61.150, all waste containers or bags shall be labeled with the following generator information:
 1. Name of waste generator
 2. Location of where waste was generated
- 12.4 Wetting of Waste: A fine water spray shall be used to keep the top layers of waste in containers thoroughly wet at all times. When a waste bag is full, air within the bags shall be evacuated with a HEPA equipped vacuum and be securely sealed with tape or other secure fastener.

- 12.5 Use And Decontamination of Fiber Drums: The Contractor's use and decontamination of fiber drums shall be in accordance with all applicable codes and regulations.
- 12.6 Waste Container Storage: The container used for the storage of bagged contaminated waste shall be an enclosed dumpster. Dumpster shall have a solid metal roof, solid metal door with padlock. As a minimum, line the cargo area with two layers of a 6-mil polyethylene sheeting to prevent contamination from damaged or leaking containers. Floor sheeting shall be installed first and shall extend up the sidewalls 24 inches minimum. Wall sheeting shall be overlapped and taped securely into place. No unbagged contaminated waste or non-asbestos waste shall be stored in these dumpsters. Ensure that bags placed in dumpsters are undamaged. Warning signs shall be posted on the dumpster in accordance with Sections 29 CFR 1926.1101 of the OSHA regulations.
- 12.7 Waste Removal Scheduling: All waste containers shall be decontaminated and removed from the site before final cleanup is started and isolation barriers are taken down. The Contractor must pre-schedule with the Department Representative for the time waste bags will be removed from the facility.
- 12.8 Waste Transportation and Disposal
- A. The Contractor shall properly remove all sealed asbestos waste bags in compliance with PA DER and all applicable rules and regulations.
 - B. All ACW must be removed from the property in accordance with Federal and State regulations.
 - C. It is the responsibility of the Contractor to determine and insure that the Contractor and his/her sub-contractor is complying with: 1) the current waste handling regulations; and 2) the current regulations for transporting and disposing waste at the ultimate disposal landfill. The Contractor must comply fully with these regulations, and with all U.S. Department of Transportation, State, local, and EPA requirements.
 - D. The Contractor's waste hauler and disposal contractor shall maintain a valid hazardous waste transporter's permit and identification number; and obtain, complete, and fully comply with any other local hazardous waste manifesting requirements.
 - E. The Contractor shall return the original Disposal Certificate to the Department's within 10 working days of waste shipment from the site. A copy of manifest forms shall be sent to the Professional after disposal is completed and all required data and signatures have been inserted.

PART 13 - OSHA AIR MONITORING

- 13.1 The Contractor shall provide, through a certified testing laboratory, air sampling as required under OSHA 1926.1101, OSHA 1910.1001 Regulations. The laboratory shall be NVLAP certified and be successfully participating in the AIHA/NIOSH Proficiency Analytical Testing (PAT). All samples shall be taken by a qualified air sampling technician as specified in the above referenced regulations. All necessary air monitoring and tests required under all applicable regulations shall be part of the work.
- 13.2 Air sampling materials and equipment requirements are as follows:

- A. Sampling for analysis by phase contrast microscopy shall employ cellulose ester collection filters with 0.8 micron pore size or less.
 - B. The filter assembly shall be upstream of all other components in the sampling train. An air flow measuring device (when used shall be downstream of the filter and the pump assembly, or integral with the pump assembly).
 - C. An air flow measuring/metering device shall be used, and shall be high quality rotometer, mass flow, dry gas meter or critical orifice. Measuring devices shall have a range of at least 1.5 times the desired flow rate and be readable to at least + 5% of the desired flow rate. They shall be calibrated against standards of higher accuracy before and after sampling. The calibrations shall be recorded.
- 13.3 A minimum of 20% of all workers in each working category (i.e., gross removal, final clearance, etc.) must be monitored each day of asbestos removal activities.
- 13.4 Area air monitoring will be conducted by an Asbestos Project Inspector contracted directly by the Department.

DIVISION 0700 - ASBESTOS FINAL CLEARANCE

PART 1 - FINAL AIR CLEARANCE

- 1.1. After encapsulating agent is dry and work area is thoroughly cleaned the Contractor, as required, shall conduct a thorough visual inspection of the work area prior to final air clearance sampling.
- 1.2. Final air testing will be conducted by representative hired by the Department. Clearance samples shall be collected and analyzed by Phase Contrast Microscopy (PCM) or Transmission Electron Microscopy (TEM) methods. The abatement project will be considered complete if the results of the samples collected in the affected work area show that the concentration of fibers for each of the collection samples is less than or equal to a limit of quantitation for PCM of 0.01 f/cc. If the work area does not satisfy air monitoring clearance criteria, the work area must be recleaned by the Contractor and new set of samples collected. The Contractor shall incur any additional services or costs associated with reaching compliance.
- 1.3. Aggressive sampling conditions shall be used by utilizing a 1 HP leaf blower to dislodge any remaining dust and by circulating the air with one twenty (20)-inch fan used for each 20,000 cubic feet (pre-demolition).
- 1.4. The Contractor shall submit any and all necessary documentation to any required Federal, State, and local agency to certify the asbestos removal project is complete in accordance with all-applicable laws, codes, and regulations.

PART 2 – CERTIFICATE OF COMPLETION

- 2.1 Upon completion of all asbestos removal from a specific work area the Contractor shall certify in writing to the Department that all known and identified ACM has been removed and the building interiors in accordance with applicable Federal, State, and local codes, laws and regulations and as

specified herein. The completion certificate shall be provided to the Department within 48 hours of the final air clearance completion.

DIVISION 0800 - PROJECT CLOSEOUT

PART 1 - FINAL INSPECTION

- 1.1 After performing all asbestos removal work the Contractor shall make a thorough visual inspection of the work area. The Department's Representative shall accompany the Contractor during the inspection for final acceptance of the work.

PART 2 - WORK AREA CLEARANCE

- 2.1 Prior to project closeout, the Contractor shall submit to the Department, with copy to the Professional three bound copies of an abatement completion report. The manual shall include the following documents:
 - A. **Originals** of all waste disposal manifests, seals, and disposal logs.
 - B. OSHA compliance air monitoring records conducted during the Work.
 - C. Project Daily log.
 - D. Project Daily reports.
 - E. Report on Special Events.
 - F. A list of all Workers used in the performance of the Project, including name, social security number, and PA DOL certification number.
 - G. For each Worker used in the performance of the Project, submit required employee statements including Medical Examination Statement, Worker's Acknowledgment Statement, Respirator Fit Test, and Employee Training Statement.

END OF ASBESTOS ABATEMENT SPECIFICATIONS

SECTION 220719

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Stipulation:
 - 1. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 – General Requirements" from a part of this section by this reference there to, and shall have the same force and effects as if printed herewith in full.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Domestic recirculating hot-water piping.
 - 4. Domestic chilled-water piping for drinking fountains.
 - 5. Sanitary waste piping exposed to freezing conditions.
 - 6. Storm-water piping exposed to freezing conditions.
 - 7. Roof drains and rainwater leaders.
 - 8. Supplies and drains for handicap-accessible lavatories and sinks.
- B. Related Sections:
 - 1. Section 220716 "Plumbing Equipment Insulation."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content and chemical components.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 2. Detail attachment and covering of heat tracing inside insulation.
 3. Detail insulation application at pipe expansion joints for each type of insulation.
 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 5. Detail removable insulation at piping specialties, equipment connections, and access panels.
 6. Detail application of field-applied jackets.
 7. Detail application at linkages of control devices.
- D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:
1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
 2. Jacket Materials for Pipe: 12 inches long by NPS 2.
 3. Sheet Jacket Materials: 12 inches square.
 4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.
 1. Piping Mockups:

- a. One 10-foot section of NPS 2 straight pipe.
 - b. One each of a 90-degree threaded, welded, and flanged elbow.
 - c. One each of a threaded, welded, and flanged tee fitting.
 - d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
 - e. Four support hangers including hanger shield and insert.
 - f. One threaded strainer and one flanged strainer with removable portion of insulation.
 - g. One threaded reducer and one welded reducer.
 - h. One pressure temperature tap.
 - i. One mechanical coupling.
- 2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
 - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 4. Obtain Architect's approval of mockups before starting insulation application.
 - 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed.
- D. Comply with the following applicable standards and other requirements specified for miscellaneous components:
- 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Foamglas
 - 2) Frost King
 - 3) Grainger
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - 5. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
 - 6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Aeroflex
 - 2) Armacell
 - 3) K-Flex
- H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Owen's Corning/Thermafiber
 - 2) Johns Manville
 - 3) Rockwool

- I. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Owen's Corning/Thermafiber
 - 2) Johns Manville
 - 3) Rockwool
2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Phenolic:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Distribution International Fabrication
 - 2) Johns Manville
 - 3) GLT Products
2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
5. Factory-Applied Jacket: ASJ. Requirements are specified in "Factory-Applied Jackets" Article.

K. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Aerofoam
 - 2) Grainger
 - 3) LSP

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Rutland
 - 2) Ramco
 - 3) Quikrete

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) VITCAS
 - 2) Cary Company

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

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

- 1) Quikrete
- 2) Rutland
- 3) Sikacrete

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Foamglas
 - 2) Foster
 - 3) Insultherm
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Armaflex
 - 2) Master Bond
 - 3) McMaster-Carr
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Foster
 - 2) Childers
 2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Caseway
 - 2) Tesa Tape
 - 3) Hexcel
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Johns Manville
 - 2) Pro Tapes
 - 3) Echo Tape
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- G. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Proto Corp
 - 2) PermaWeld
 - 3) Johns Manville
 2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Ellsworth Adhesives

- 3) AIM Building Materials
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Ellsworth Adhesives
 - 3) AIM Building Materials
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Ellsworth Adhesives
 - 3) AIM Building Materials
2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Ellsworth Adhesives
 - 3) AIM Building Materials
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Vimasco
 - 2) Design Polymeric

- 3) Ductmate
3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
4. Service Temperature Range: 0 to plus 180 deg F.
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) 3M
 - 2) Henkel
 - 3) Sika
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Foster
 - 3) Mon-Eco
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) SPI
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Childers
 - 2) Fibreglast
 - 3) Rockwest
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Vimasco
 - 2) Foster
 - 3) Mutual

2.9 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Alpha
 - 2) Tap Plastics

2.10 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Johns Manville
 - 2) Proto Corporation
 - 3) PIC Plastics Inc
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ITW Insulation Systems
 - 2) RPR Products
 - 3) Johns Manville
2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Sheet and roll stock ready for shop or field sizing
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper
 - e. Factory-Fabricated Fitting Covers:

- 1) Same material, finish, and thickness as jacket.
- 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
- 3) Tee covers.
- 4) Flange and union covers.
- 5) End caps.
- 6) Beveled collars.
- 7) Valve covers.
- 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

D. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Pittsburg Corning
 - 2) Polyguard Products

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) 3M
 - 2) Avery Dennison Corporation, Specialty Tapes Div.
 - 3) Ideal Tape Co.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) 3M
 - 2) Avery Dennison Corporation, Specialty Tapes Div.
 - 3) Ideal Tape Co.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) 3M
 - 2) Ideal Tape Co.
 - 3) Scapa
2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) 3M
 - 2) Ideal Tape Co.
 - 3) Nashua
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ITW Insulation Systems
 - 2) RPR Products Inc
 - 3) Ideal Tape Co.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 3040.015 inch thick, 3/4 inch wide with wing seal
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) C&F Wire
 - 2) WireCrafters

2.13 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) McGuire Manufacturing
 - 2) Buckaroos
 - 3) Zurn
 - 4) Just Manufacturing
2. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply] and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Truebro
 - 2) Zurn
2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - 1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 - 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 - 4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as

recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.

2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.11 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
 1. Draw jacket material smooth and tight.
 2. Install lap or joint strips with same material as jacket.
 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints. For exposed piping, apply up to 8 feet AFF.

3.12 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

- D. Do not field paint aluminum or stainless-steel jackets.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.14 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.15 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 - 1. NPS 1 and Smaller: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch]thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
 - 2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.

- B. Domestic Hot and Recirculated Hot Water:
1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
 2. NPS 1-1/2 and Larger: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
- C. Stormwater and Overflow:
1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
- D. Roof Drain and Overflow Drain Bodies:
1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
- E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - c. Polyolefin: 1 inch thick.
- F. Sanitary Waste Piping Where Heat Tracing Is Installed:
1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.
 - c. Phenolic: 1-1/2 inch thick.

- G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Flexible Elastomeric: 1 inch thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - d. Phenolic: 1 inch thick.
 - e. Polyolefin: 1 inch thick.
- H. Hot Service Drains:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.
- I. Hot Service Vents:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch thick.

3.16 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Domestic Water Piping:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 2 inches thick.
 - b. Flexible Elastomeric: 2 inches thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
 - d. Phenolic: 2 inches thick.
 - e. Polyolefin: 2 inches thick.
- B. Domestic Hot and Recirculated Hot Water:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 2 inches thick.
 - b. Flexible Elastomeric: 2 inches thick.
 - c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
 - d. Phenolic: 2 inches thick.
 - e. Polyolefin: 2 inches thick.
- C. Sanitary Waste Piping Where Heat Tracing Is Installed:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches thick.
 - c. Phenolic: 2 inchesthick.

D. Hot Service Drains:

1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

E. Hot Service Vents:

1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type II: 1 inch

3.17 OUTDOOR, UNDERGROUND PIPING INSULATION SCHEDULE

- A. Sanitary Waste Piping, All Sizes, Where Heat Tracing Is Installed: Cellular glass, 2 inches thick.

3.18 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

B-1. PVC: 20 mils

C-D. Piping, Exposed:

1. Stainless Steel, Type 304 Smooth 2B Finish: 0.024 inch thick for 8 feet AFF.-

3.19 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Exposed:

1. Stainless Steel, Type 304 Smooth 2B Finish 0.024 inch thick.

3.20 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

- A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 220719

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 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.

1.11 TERMINATION OF MONITORING

- A. Monitoring shall continue until the ground level floor of the Marquee building is constructed unless otherwise agreed upon with the Department and the Department's Professionals.

PART 2 THE DEPARTMENT MAY REQUIRE MONITORING FOR AN ADDITIONAL DURATION; COSTS FOR ADDITIONAL MONITORING CAN BE DETERMINED IF MONITORING BEYOND THE BASE SCOPE IS REQUESTED BY THE DEPARTMENT.

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

SECTION 313226

PERMANENT SOIL NAIL WALL

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 permanent soil nail retaining wall support in accordance with requirements of the Contract Documents.
- C. Section includes, but is not limited to, the following:
1. All labor, materials, equipment, and accessories necessary for the completion of all work as shown on Contract Drawings, as specified herein, and as required by the conditions at the site, are a part of the Contract.
 2. All professional engineering, surveying, layout, monitoring, and submittals in connection with the work in this Section.
 3. The Contractor shall design the soil nail wall to meet the performance requirements specified herein or shown on the Contract Drawings. Design shall include global and internal stability, deformation analysis and selection of corrosion protection.
 4. All excavation required for the work of this Section.
 5. Drilling and installing of permanent soil nail reinforcement
 6. Grouting soil nail anchors
 7. Verification and Proof testing of permanent soil nails.
 8. Construction of temporary and permanent soil nail wall facing.
 9. Protection of all permanent soil nails.
 10. Soil nail location survey and identification plan.
 11. As-built drawings.
 12. Provide all other labor, services, materials, and equipment as may be reasonably inferred to complete the work of this Section.
- D. Temporary soil nail retaining walls are not included in this specification.

- E. 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. Section 033000 – Cast-in-Place Concrete
 2. Section 071000 – Foundation Waterproofing
 3. Section 310000 – Earthwork
 4. Section 310901 – Monitoring of Structures and Utilities

1.2 STANDARDS AND REFERENCES

- A. General: Except as modified or voided by requirements specified herein or by details or notes included in the Contract Drawings, the Work specified under this Section shall conform to all applicable provisions of the codes, specifications, standards and other reference documents cited in this Specification and noted in the Contract Drawings.
- B. Where more stringent, the following codes, standards and specifications (latest edition), shall apply to the Work of this Section, all as modified herein:
1. Federal Highway Administration (FHWA) Geotechnical Engineering Circular 7, Soil Nail Walls – Reference Manual.
- C. American Society for Testing and Materials (ASTM) Standards cited in the reference standards, codes, Building Code, this Specification or in cited reference documents shall be the year of adoption or tentative adoption and revision listed in the latest edition of the Annual Book of ASTM Standards, "Index", except that, should a specific year of adoption or revision be cited by the Contract Documents, by the Building Code, or be proposed by the Contractor and accepted by the Department, that edition shall apply to and control the Work.
- D. Geotechnical Report: The Geotechnical Professional engaged by the Department has prepared a report entitled Design Level Geotechnical Engineering Study, prepared by Langan, dated 7 January 2022. Copies of the report are available to the Contractor for reference. Boring and other in situ test logs are made available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between borings and test pits. The Department will not be responsible for interpretation conclusions drawn from this data by the Contractor.
- E. In case of conflict between regulations and specifications, the Contractor shall comply with the most stringent requirements outlined in the applicable codes, regulations, and specifications.

1.3 AVAILABLE INFORMATION AND DESIGN REQUIREMENTS

- A. Available information developed by the Department's Professionals includes the Contract Drawings showing the wall layout and dimensions.
- B. The soil nail wall shall be designed for a minimum service life of 75 years.
- C. The soil nail wall shall be designed for a maximum wall deflection/distortion of 0.003 ($\Delta h/H$), unless other criteria are agreed upon at the time of bid between the Contractor and the Department.

- D. The design loads for the adjacent proposed foundations are shown on the Contract Drawings. The Contractor shall incorporate all surcharge loads from adjacent foundations.
- E. The adjacent building will remain during construction and must be protected by the Contractor. Drawings showing the existing building foundations are available for reference. The Contractor shall evaluate the structural stability of the existing building and determine if the existing building to remain adjacent to the soil nail wall must be stabilized or underpinned. If any structural stability or underpinning is required, the Contractor shall be responsible for the design of the stabilization methods and underpinning. The loads from the existing building must be evaluated in the soil nail wall design.
- F. All soil nails shall have Class A corrosion protection – encapsulation.

1.4 DEFINITIONS

- A. Soil Nail: a reinforcing bar grouted into a drilled hole installed in any type of ground. Soil nails walls are built from the top down in existing ground.
- B. Shotcrete: mortar or concrete pneumatically projected onto a surface at high velocity.
- C. Pullout Failure: A pullout failure during verification or proof tests occurs when attempts to further increase the test load result in continued pullout movement of the soil nail.

1.5 SUBMITTALS

- A. Unless otherwise indicated, transmit all submittals to the Department for review. Review of submittals by the Department, the Department's Professionals is required before proceeding with ordering, fabricating, or any work of this Section. 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 their work, nor shall review by Department's Professionals be construed to be an approval of means and methods or design. All material orders are the sole responsibility of the Contractor.
- B. Personnel: The following resumes shall be submitted to the Construction Manager at least 45 days prior to start of soil nail work:
 - 1. Contractor Staff: Submit resumes for Superintendent and Foremen to be engaged construction and oversight of the work. Only those personnel approved by the Department shall be used for the project. The Department shall approve or reject the Contractors qualifications within 15 working days from receipt of submittal. The Contractor shall not make substitutions for staff without the consent of the Department. No work shall be performed on-site until all qualifications are approved.
 - 2. Professional Engineering: Submit the name of Contractor's Professional Engineer engaged for the design of permanent soil nail wall. The Professional Engineer shall be licensed in the Commonwealth of Pennsylvania with at least 10 years of relevant experience.
- C. Previous Work: Submit satisfactory proof of Contractor or Subcontractor qualifications for performing the work specified herein. Provide at least three projects in similar scope and nature that were completed within the last three years by the Contractor. Projects should total at least 10,000 square feet of wall face area and at least 500 soil nails. Each project resume shall include the name, address, relevant contact information for Owner and Engineers, contract value, scheduled and actual completion dates of the project.

- D. Completed project reference list that identify the supervising engineer, drill rig operators, and on site supervisors assigned to the project. The personnel list shall contain a summary of each individual's experience and be complete enough for the Department to determine whether each individual satisfies the required qualifications. Work shall not be started nor materials ordered until the Department's written approval of the Contractor's qualifications is given.
- E. Record Project Documents: After each test submit results of all tests including applied load charts no later than 48 hours of each test. After completion of the nail installation, a survey prepared by a Professional Land Surveyor, licensed in the Commonwealth of Pennsylvania, showing the completed locations of the nails with respect to their proposed locations. The survey shall show actual location centers of nails made from accurate field surveys, and other pertinent data.
- F. The Contractor shall provide the Department with an as-built drawing showing as-built soil nail locations and as-built shotcrete facing line and grade within 5 days after completion of the shotcrete facing.
- G. General Design Submittals
1. At least 45 days before the planned start of the wall construction, the Contractor shall submit complete design calculates and Design Drawings to the Department's Professionals for review and approval.
 2. Design Drawings and calculations shall be signed and sealed by the Contractor's Professional Engineer.
 3. The grout mix design and procedures the Contractor intends to use for grouting of the nails.
 4. Plan and procedures for nail placement and grouting.
 5. The Contractor shall not begin the work until the submittal requirements are satisfied and found acceptable by the Department's Professionals.
 6. Changes or deviations from the approved submittals must be re-submitted for approval. No adjustments in contract time or delay, or impact claims will be allowed due to incomplete submittals.
- H. Design Calculations: Detailed calculations shall be provided for soil nails implemented under this Section, including, but not limited to, the following items:
1. List all references including codes, standards, and reports.
 2. A narrative describing the overall soil nail wall design.
 3. All details of subsurface profiles, soil/rock design parameters, and groundwater. Soil and rock shear strength parameters, unit weights, pullout resistances, steel resistances, and shotcrete resistance values.
 4. Any additional subsurface borings, laboratory testing, or other subsurface data collected for the design shall be included.
 5. All assumptions made.

6. Soil nail critical cross-section(s) including soil/rock strata, piezometric levels, and location, magnitude and direction of applied loads.
 7. Values and associated load factors used in design for pullout resistance, surcharges, soil/rock unit weights, nail head strengths, and strengths of steel, shotcrete, and concrete materials.
 8. Global stability soil resistance/load factors used in LRFD verifications.
 9. Structural design calculations for the wall facings and nail head/facing connections including consideration of facing flexural and punching shear strength, headed stud tensile strength, upper cantilever, minimum reinforcement ratio, cover, and splice requirements.
 10. Drainage evaluation.
 11. Calculations shall fully illustrate all equations used and shall note the reference used for each equation. Where spreadsheets are provided, they shall be accompanied by sample calculations illustrating the equation used in each cell.
 12. Calculations shall detail all materials, element sizes, lengths, spacing, and construction sequence, and any requirements for testing.
 13. Calculations shall detail all connections.
- I. Design Drawings: Shall include all information required for the construction and quality control of the work. Design Drawings shall include, but not be limited to, the following items unless provided in the Contract Drawings:
1. A plan view of the structures identifying:
 - a. A reference baseline and elevation datum.
 - b. The offset from the construction centerline or baseline to the face of the wall at its base at all changes in horizontal alignment.
 - c. Beginning and end station of wall.
 - d. Soil nail locations.
 - e. Locations of all known active and abandoned existing utilities, adjacent structures and foundations, and other pertinent interferences.
 - f. The centerline of any drainage structure or drainage pipe behind, passing through, or passing under the wall.
 - g. Subsurface exploration locations shown on a plan view of the proposed wall alignment with appropriate reference base lines to fix the locations of the explorations relative to the structures.
 - h. Limits of the soil nails.
 2. An elevation view of the structures identifying:

- a. The elevation at the top of the wall, at all horizontal and vertical break points, and at least every 50 feet along the wall.
 - b. Elevations at the base of the wall and the top of leveling pads for casting cast-in-place facing, if applicable.
 - c. Soil-nail elevations, vertical and horizontal spacing, and the location of the wall drainage elements and permanent facing expansion/contraction joints (if applicable) along the wall length.
 - d. Existing and finished grade profiles both behind and in front of the wall.
3. All necessary cross sections to construct the wall. At a minimum, a cross section shall be provided at each assumed change in subsurface conditions, and at any change in nail layout, length, inclination, or spacing.
 4. General notes for constructing the soil nail including construction sequencing or other special construction requirements.
 5. A listing of the summary of quantities on the elevation drawing of each wall showing the estimated surface area expressed in square feet, and other pay items.
 6. Nail wall typical sections including staged excavation lift elevations, wall and excavation face batter, nail spacing and inclination, sizes of nail bars (also referred to as tendons), and corrosion protection details.
 7. Typical details of production and test nails defining the nail length, minimum drill hole diameter, inclination, and test nail bonded and unbonded test lengths.
 8. Details, dimensions, and schedules for all nails, reinforcing steel, wire mesh, bearing plates, headed studs, etc. and/or attachment devices for shotcrete, cast-in-place or prefabricated facings.
 9. Dimensions and schedules of all reinforcing steel including reinforcing bar bending details.
 10. Details and dimensions for wall appurtenances such as coping, drainage, sidewalk, etc.
 11. Details for terminating walls.
 12. Details for constructing walls around utility penetrations.
 13. Facing finishes.
- J. Any additional subsurface Submit calibration reports of each hydraulic jack and pressure gauge unit indicating jack and pressure gauge identification numbers and a calibration curve at least one week prior to beginning any load tests. Hydraulic jack(s) and pressure gauge shall be calibrated as a unit by a certified testing laboratory not more than one month before their use at the site.
- K. Submit results of all tests including applied load charts no later than 24 hours after each load test. Submittal shall be signed and sealed by a Professional Engineer licensed in the Commonwealth of Pennsylvania.

- L. Submit original manufacturer's certificates for all materials as specified herein.
- M. Construction Submittals
 - 1. Construction Plan – at least 30 days before starting the soil nail work, the Contractor shall submit a Construction Plan to the Department's Professional that includes the following:
 - a. Project start data and proposed detailed wall construction sequence.
 - b. Drilling and grouting methods and equipment, including the drill hole diameter proposed to achieve the specified nominal pullout resistance values and any variation of these along the wall alignment.
 - c. Nail grout mix design, including compressive strength test results (per AASHTO T106/ASTM C109) supplied by a qualified independent testing lab verifying the specified minimum 3-day and 28-day compressive strengths. For neat cement grout include specific gravity test results of the fresh grout used for compressive testing.
 - d. Nail grout placement procedures and equipment setup.
 - e. Identification number and certified calibration records for each test jack, pressure gauge, dial gauge, and load cell to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, the device identification number, and the calibration test results, and shall be certified for an accuracy of at least 2% of the applied certification loads by a qualified independent testing laboratory within 90 days prior to submittal.
 - f. Manufacturer's Certificates of Compliance for materials including: ultimate strength of the bar/tendon, Portland cement, centralizers, bearing plates, epoxy coating, and encapsulation.
 - g. Approval of the Construction Plan by the Department's Professionals does not relieve the Contractor of his responsibility for the successful completion of the work.
- N. Monitoring: The Contractor shall submit a monitoring plan including structures to remain and be protected and the soil nail wall. Monitoring results shall be submitted within 2 days after completion of monitoring work. Monitoring shall be as per section 31 09 01.

1.6 PROJECT CONDITIONS AND SUBSURFACE INFORMATION

- A. Subsurface Conditions: The subsurface conditions within the site generally consists of residual silt and clay soils over shale hardpan and bedrock.
- B. The site is in a region known for karst activity. Limestone might be encountered along with solution cavities and pinnacles.
- C. Any available data concerning subsurface materials or conditions based on soundings, test pits or test borings, has been obtained by the Department for its own use in designing this Project. The Test Boring location drawings and the Test Boring Logs, as well as the Laboratory Test Results, contained within the Geotechnical Report are incorporated into the construction contract as a Contract Document. The remainder of the Geotechnical Report,

with all other exhibits, is available for informational/guidance purposes only; it is not to be relied on by prospective Bidders. The Report is available to Bidders but the Bidders must agree and acknowledge that the information and recommendations in the Report are not warranted for accuracy, correctness or completeness, and is not incorporated into the construction contract as a Contract Document.

- D. Test Boring and Test Pit logs reflect the conditions at the specific locations of each Test Boring and Test Pit only. The Contractor accepts full responsibility for any conclusions drawn with respect to conditions between Test Borings and Test Pits. Bidders may perform their own investigation of existing subsurface conditions, with the Department's approval.
- E. The Contractor, by careful examination, shall inform himself as to the nature and location of the work; the conformation of the ground, the nature of the subsurface conditions; the locations of groundwater; the character, quality and quantity of the materials to be encountered; the character of the equipment and facilities needed preliminary to and during the execution of the work; the conditions of adjacent structures and utilities; and all other matters which can in any way effect the work.
- F. The Contractor shall be held to have visited the site and to have familiarized himself with the existing conditions of adjoining properties, utilities and buildings.
- G. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, ingress and egress of the site of the work. The Contractor shall conform to all State and Federal regulations in regard to the transportation of materials to and from and at the job site and shall secure in advance such permits as required.

1.7 EXISTING UTILITIES

- A. Locate existing underground utilities within and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work. Utilities scheduled for relocation are identified in the Contract Documents.
- B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with the Department and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.
- C. Do not interrupt existing utilities serving facilities occupied by the Department or others, during occupied hours, except when permitted in writing by the Department and then only after acceptable temporary utility services have been provided. Provide a minimum of 48 hour notice to the Department, and receive written notice to proceed before interrupting any utility.
- D. Where necessary, demolish and completely remove existing underground utilities indicated to be removed from the site. Coordinate with utility companies for shutoff of services if lines are active.
- E. Examine drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

1.8 CONTRACTOR QUALITY CONTROL

- A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of authorities having jurisdiction. Obtain necessary approvals from all such authorities.
- C. Materials and work shall conform to the latest edition of reference standards specified herein and to applicable codes and requirements of local authorities having jurisdiction.
- D. Contractor Qualifications: The Contractor performing the work of this Section shall demonstrate that the firm and their personnel they intend to use for this project have at least five recent successfully completed contracts installing permanent **soil nail walls** of the types, size and scale as those specified for this project. The staff for this project shall include a supervising engineer with at least five years of experience in the installation of permanent **soil nail walls**. Drilling operators and foremen shall have a minimum of three years of experience installing permanent soil nails.
- E. Design Supervision: The Contractor shall retain the services of a Licensed Professional Engineer licensed in the Commonwealth of Pennsylvania who shall design and/or approve all soil nail work. The Contractor's Professional Engineer shall sign and seal all submittals related to **the soil nail wall** and shall **participate in** all meetings **related to the soil nail wall design, construction and monitoring**.
- F. Codes and Permits:
 - 1. Comply with the Pennsylvania Building Code, and any other Federal, State, or Local codes and ordinances having jurisdiction.
 - 2. All labor, materials, equipment and services necessary to make the work comply with such requirements shall be provided without additional cost to the Owner.
 - 3. The Contractor shall procure and pay for all permits and licenses required to complete the work of this Section.
- G. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be done at Department's expense, as required. Re-testing of rejected materials and installed work shall be Contractor's responsibility and shall be done at Contractor's expense

1.9 QUALITY ASSURANCE – INSPECTION AND TESTING

- A. Construction Stage Geotech Quality Assurance Agent
 - 1. The Department will engage one or more Special Inspection Agencies to observe and provide all necessary material testing related to the work of this Section.
 - 2. All **soil nail wall** installation including drilling, reinforcement installation, grouting, and testing, shall be observed by the Geotech Quality Assurance Agent on a full-time basis, unless otherwise approved by the Department's Professional.
 - 3. The Geotech Quality Assurance Agent shall prepare and submit daily reports summarizing the construction and material testing. Reports shall include

descriptions and sketches of the work performed to clearly document plan location(s) and elevation(s) of any excavations, fill placement, and testing performed. This shall not relieve the Contractor's responsibility to provide any component or system capable of meeting the requirements outlined on the Contract Drawings and as specified herein.

4. The Geotech Quality Assurance Agent shall submit all logs and test reports necessary to facilitate any corrective design requirements by the Engineer of Record.
 5. Where work is observed to be non-conforming, the Geotech Quality Assurance Agent shall immediately inform the Department and the Department's Professionals of such conditions in writing. A summary of the observed non-conformance shall be issued within 24 hours. The Geotech Quality Assurance Agent shall maintain a tracking log of all non-conformances and shall update the tracking log on a daily basis such that corrective measures, if required, can be facilitated in timely fashion. The tracking log shall include such information as ID number, date opened, description of non-conformance, actions required, actions taken, and date closed.
- B. The Contractor shall have the sole responsibility for coordinating his work with the Department to assure that all tests and inspection procedures required by the Contract Documents and the governing Building Codes are properly provided by the Geotech Quality Assurance Agent. The Contractor shall cooperate fully with the Geotech Quality Assurance Agent.
 - C. Materials and installed work may require testing at any time as work progresses. Allow free access to material stockpiles and facilities. Tests not specifically indicated herein may be performed at Department's expense, as required by the Geotech Quality Assurance Agent.
 - D. Retesting of rejected materials and installed work shall be Contractor's responsibility and shall be performed at his expense.
 - E. The Contractor shall notify the Department and all other necessary parties at least 72 hours before each day of required inspection to allow for the appropriate personnel to be onsite.
 - F. The role of the Geotech Quality Assurance Agent shall not relieve the Contractor from any responsibility with respect to conformance to the proper workmanship, management of materials and waste, or any other requirements of the Contract Documents.

1.10 PRECONSTRUCTION MEETING

- A. Before beginning work on site, the Department will arrange a series of meetings to discuss coordination and scheduling. Parties to be present: the Department, the Department's Professionals, Materials Testing Laboratory, **soil nail** Contractor (and the Contractor's Professional Engineer), and Geotech Quality Assurance Agent. Review the anchor construction procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least three working days before convening meeting. Contractor shall record discussions and agreements and furnish a copy to each participant.

PART 2 - CONSTRUCTION REQUIREMENTS

2.1 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in manufacturer's original packaging, labeled to show name, brand, type, and grade. Store materials in protected location off ground in accordance with manufacturer's instructions.
- B. Tendons shall be stored and handled in a manner to avoid damage or corrosion. Tendons exhibiting abrasions, cuts, welds, weld splatter, corrosion, or pitting shall be replaced. Bars exhibiting damage to encapsulation shall be repaired or replaced at no additional cost.

2.2 EXCAVATION

- A. The height of the unsupported final excavation face cut shall be established by the Contractor and shall not exceed the vertical nail spacing plus the required reinforcing lap or the short-term stand-up height of the ground, whichever is less.
- B. Excavation to the final wall excavation line and shotcrete application shall be completed in the same work shift, unless otherwise approved by the Department's Professional.
- C. Nail grout and shotcrete shall achieve sufficient strength before excavating the next underlying lift.

2.3 SOIL NAIL INSTALLATION

- A. Drill holes for the soil nails shall be drilled at the locations, elevations, orientations, and lengths shown on the approved Design Drawings.
- B. The drilling equipment and methods shall be selected by Contractor to be suitable for the ground conditions and in accordance with the accepted installation methods submitted by the Contractor.

2.4 PROTECTION OF ADJACENT STRUCTURES

- A. Structures located adjacent to the soil nail wall including the dorm structure to remain during construction shall be monitored for vertical and horizontal movement in a manner approved by the Department's Professionals within an accuracy of 0.01 inch.
- B. Monitoring of adjacent structures will be done by an independent party who must be approved by the Department's Professionals and will work under the Contractor.
- C. A monitoring plan, including the locations of measurement points and the frequency of recording measurements shall be submitted to the Department's Professionals as part of the Construction Plan. Monitoring shall begin with a base-line measurement recorded no less than 10 calendar days prior to construction of the soil nail wall.
- D. In addition to monitoring to movement, the condition of the adjacent structure, including cracks and crack widths, before, during and after construction of the wall shall be documented by visual inspection, photographs, and/or video.
- E. As soon as the movement measured exceed thresholds established for the adjacent structures, the Contractor shall stop construction, notify the Department and the Department's Professionals, and take any immediate remedial measures required to prevent damage to the adjacent structures. The Contractor and the Department's

Professionals shall then review the current installation procedures. If revisions to the installation procedures are deemed necessary, the Contractor shall submit a revised installation plan for approval by the Department's Engineers before resuming work.

2.5 SOIL NAIL TESTING

A. General

1. The Contractor shall perform both verification and proof testing of designated test soil nails.
2. Verification tests on sacrificial test nails shall be conducted at locations shown on the approved Design Drawings.
3. Proof tests on production nails shall be conducted at locations selected by the Department's Professional.
4. Testing of any nail shall not be performed until the nail grout and shotcrete facing have cured for at least 72 hours or attained at least their specified 3-day compressive strength.
5. The Contractor shall not apply loads greater than 80% of the minimum guaranteed ultimate tensile strength of the tendon for Grade 150 bars or 90% of the minimum guaranteed ultimate tensile strength of the tendon for Grade 60 or 75 bars.
6. Preliminary results shall be submitted to the Department's Professionals within 24 hours of the test completion. A full test report containing test load results shall be submitted to the Department's Professional within 5 working days of the test completion.

B. Verification Testing

1. The Contractor shall perform a number of verification tests on sacrificial soil nails as established in the Design Drawings.
2. Verification testing shall be conducted prior to installation of production nails on sacrificial soil nails to confirm the appropriateness of the Contractor's drilling and installation methods, and verify the required nail pullout resistance.
3. The maximum test load in verification tests (VTL) shall be calculated based on as-built bonded lengths per FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9. The Load Schedule for Verification Testing shall comply with FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9.

C. Proof Testing

1. Successful proof testing shall be demonstrated on at least 5% of production soil nails in each nail row or a minimum of one per row.
2. The Department's Professional shall determine the locations and number of proof tests prior to nail installation in each row. Verification tests shall not be counted towards the minimum of 5% of production nails.
3. The maximum test load in proof tests (PTL) shall be calculated based on as-built bonded lengths per FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9.

The Load Schedule for Proof Testing shall comply with FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9.

D. Acceptance Criteria

1. Verification Tests

- a. Considering that pullout is defined as the load at which attempts to further increase the test load increments simply result in continued movement of the tested nail, a test nail shall be considered acceptable when all the following criteria are met.
 - 1) The total creep movement is less than 0.08 inches between the 6- and 60-minute readings, and the creep rate is linear or decreasing throughout the creep test load hold period.
 - 2) The total movement (Δ VTL) measured at VTL exceeds 80% of the theoretical elastic elongation of the unbonded length of the test nails, as defined in FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9.
 - 3) Pullout does not occur before achieving 1.0 x VTL.

2. Proof Tests

- a. The creep movement between the 1- and the 10-minute readings is less than 0.04 inches.
- b. In cases when the creep movement between the 1- and the 10-minute readings is greater than 0.04 inch, the creep movement between the 6- and 60-minutes readings is less than 0.08 inches and the creep rate is linear or decreasing throughout the creep test load hold period.
- c. The total soil nail movement (Δ PTL) measured at PTL exceeds 80% of the theoretical elastic elongation of the unbonded length, as defined in FHWA Geotechnical Circular No. 7 "Soil Nail Walls" Chapter 9.
- d. Pullout does not occur before achieving 1.0 x VTL.
- e. The temporary unbonded test length in proof tests is successfully maintained for subsequent satisfactory grouting. If the unbonded test length of production proof test nails cannot be satisfactorily grouted after testing, the proof test nail shall become sacrificial and shall be replaced with an additional production nail installed at no additional cost to the Department.

2.6 REJECTION OF TEST SOIL NAILS

A. Verification Test Soil Nails

- 1. The Department's Professional will evaluate the results of each verification test. Installation methods that do not satisfy the nail testing requirements shall be rejected. The Contractor shall propose alternative methods for review by the Department's Professional and shall install replacement verification test nails.

Replacement test nails shall be installed and tested at no additional cost to the Department.

B. Proof Test Soil Nails

1. For proof test nails, the Department's Professional may require the Contractor to replace some or all of the installed production nails between a failed proof test soil nail and the adjacent passing proof test nail.
2. Alternatively, the Department's Professional may require the installation and testing of additional proof test nails to verify that adjacent previously installed production nails have sufficient nominal pullout resistance. Installation and testing of additional proof test nails or installation of additional or modified nails as a result of proof test nail failure(s) shall be at no additional cost to the Department.

2.7 WALL DRAINAGE SYSTEM

A. General

1. Provide all elements of a soil nail wall drainage system consisting of geocomposite drain strips, PVC connection pipes, soil nail wall footing drains, and weepholes, or similar, that will provide a continuous path for water flow and prevent pore water pressure from building up behind the wall.

B. Geocomposite Strip Drain

1. Provide geocomposite strip drain or similar to prevent pore water pressure from building up behind the wall and to convey the collected groundwater to the base of the wall behind the wall.
2. Geocomposite strip drain shall have sufficient capacity to convey all drained groundwater, and sufficient resistance to prevent collapse during construction and operation.

C. Footing Drains

1. Footing drains shall collect groundwater from the drainage system and convey it to the stormwater management system.

2.8 SHOTCRETE FACING

A. General

1. Initial shotcrete facing and final shotcrete facing shall be provided as required and as shown on the approved Design Drawings.

B. Shotcrete Facing Tolerances - Construction tolerances for the shotcrete facing from plan location and plan dimensions shall be as follows:

2.9 REINFORCING STEEL

- A. The Contractor shall submit all order lists and reinforcement bending diagrams to the Department's Professional, and shall fabricate reinforcing steel, ship and protect material, place, fasten, and splice reinforcing steel as shown on the approved Design Drawings.

2.10 STRUCTURAL CONCRETE

- A. The Contractor shall design the concrete mix; store, handle, batch, and mix material; and deliver concrete; provide quality control; and construct concrete facing to meet the resistance requirements shown on the approved Design Drawings.

2.11 ARCHITECTURAL SURFACE FINISHES

- A. The Contractor shall submit detailed drawings of the form liner for approval by the Departments Professionals at least 7 calendar days before form liner work begins.
- B. Before production work begins, a 3-ft high, 10-ft long test panel shall be constructed on site using the same forming methods, procedures, form liner, texture configuration, expansion joint, concrete mixture, and color/stain application proposed for the production work. One test panel per wall finish type shall be furnished.

2.12 CORROSION PROTECTION

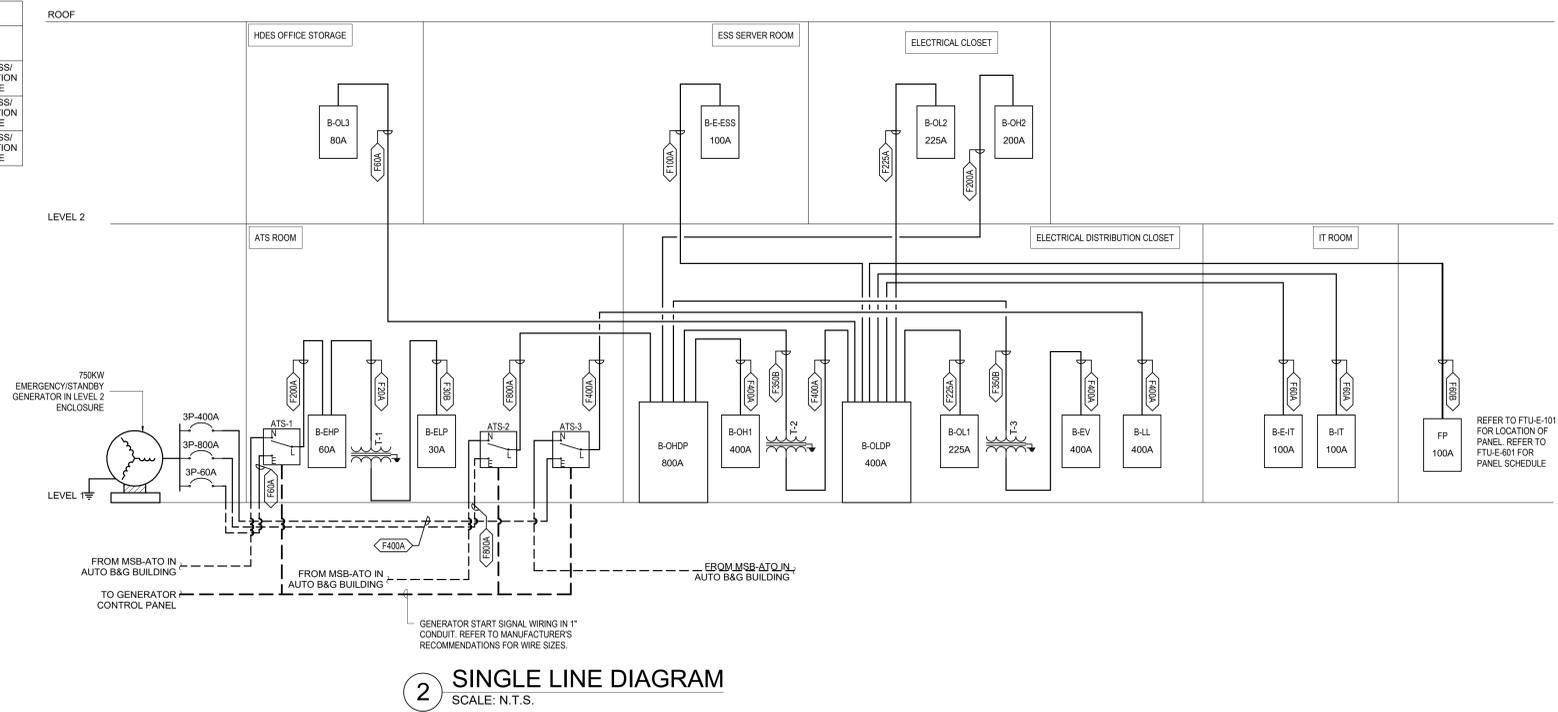
- A. Soil nails and soil nail head components shall be protected against corrosion consistent with the ground and groundwater conditions at the site and Class A corrosion protection.

END OF SECTION

ATS TAG	VOLTAGE	RATING	SHORT CKT RATING	NO. OF POLES	ENCLOSURE	REMARK	PRIORITY	CATALOG NUMBER	BYPASS/ ISOLATION TYPE
ATS 1	277/480V 3PH,4W	80A	65 KAIC	4	NEMA - 1	OPEN TRANSITION TYPE	LEGALLY REQUIRED	COPPER	BYPASS/ ISOLATION TYPE
ATS 2	277/480V 3PH,4W	800A	65 KAIC	4	NEMA - 1	OPEN TRANSITION TYPE	LIFE SAFETY - LESS THAN 10 SECS	COPPER	BYPASS/ ISOLATION TYPE
ATS 3	277/480V 3PH,4W	400A	65 KAIC	4	NEMA - 1	OPEN TRANSITION TYPE	OPTIONAL STANDBY	COPPER	BYPASS/ ISOLATION TYPE

FEEDER TAG	FEEDER DESCRIPTION
F20A	3#12+1#12G IN 3/4"C
F30A	3#1+1#10G IN 3/4"C
F30B	4#10+1#10G IN 3/4"C
F60A	4#4+1#10G IN 1-1/4"C
F60B	4#20+1#6G IN 2"C
F110A	4#1+1#6G IN 1-1/2"C
F200A	4#30+1#6G IN 2"C
F225A	4#40+1#4G IN 2-1/2"C
F226B	3#4+1#4G IN 2"C
F350B	4#500KCML+1#3G IN 4"C
F400A	4#600KCML+1#3G IN 4"C
F800A	(2) SETS OF 4#600KCML+1#10G IN (2) 4"C

XMTR TAG	PRIMARY VOLTAGE	SECONDARY VOLTAGE	KVA RATI..	ENCLOSURE	WINDING
T1	480V	208/120V	9	NEMA - 1	COPPER
T2	480V	208/120V	225	NEMA - 1	COPPER
T3	480V	208/120V	225	NEMA - 1	COPPER



2 SINGLE LINE DIAGRAM
SCALE: N.T.S.

PROVIDE OVER-CURRENT PROTECTION DEVICE, SHORT-CIRCUIT COORDINATION AND ARC FLASH STUDIES ON ALL THE ELECTRICAL EQUIPMENT INDICATED ON THIS DRAWING TO THE ENGINEER PRIOR TO RECEIVING FINAL APPROVAL OF THE DISTRIBUTION EQUIPMENT SHOP DRAWINGS AND/OR PRIOR TO RELEASE OF EQUIPMENT DRAWINGS FOR MANUFACTURING.

IMPORTANT NOTE
CONTRACTOR SHALL SUBMIT THE SWITCHGEAR SHOP DRAWING TO CON EDISON METERING AND INSPECTION DEPARTMENT FOR REVIEW TO COMPLY WITH CON EDISON REQUIREMENT AS PER CON EDISON HANDBOOK, AND GET FINAL APPROVAL FROM THE METERING AND INSPECTION SUPERVISOR PRIOR TO ORDERING THE SWITCHBOARD.

GENERAL NOTES			
1.	REFER TO GEN-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.		
2.	REFER TO BSO-E-001 FOR PANEL SCHEDULES.		
3.	REFER TO GEN-E-701 FOR DETAILS.		
4.	NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.		
5.	DISCONNECT SWITCHES FOR ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED BY THE EQUIPMENT MANUFACTURER. COORDINATE WITH MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.		

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 AVIATION 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
POOL DESIGN
Aqua Design International 7536 N. La Cholla Blvd Tucson, AZ 85741

KEYPLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	07 JUL 2023	ADDENDUM 31			
1	19 MAY 2023	ISSUED FOR BID			

RECORD REVISIONS					
NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

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

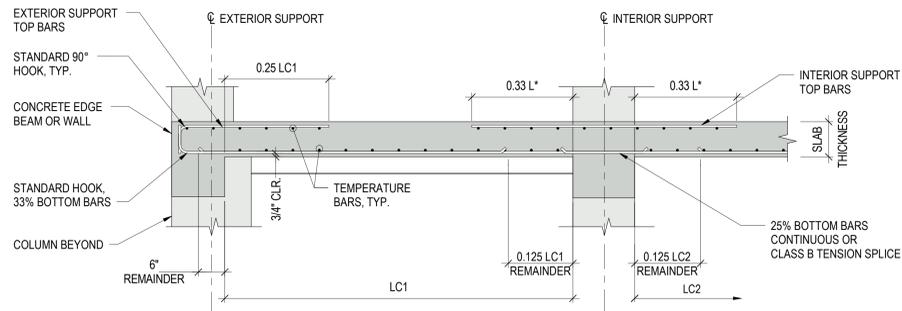
BAR IS ONE (1) INCH LONG
ON ORIGINAL DRAWING: 0 1

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.

SHEET No. **BSO-E-402**

DRAWN BY	CHECKED BY	DATE	SCALE
AA	MK	APR 2022	AS NOTED

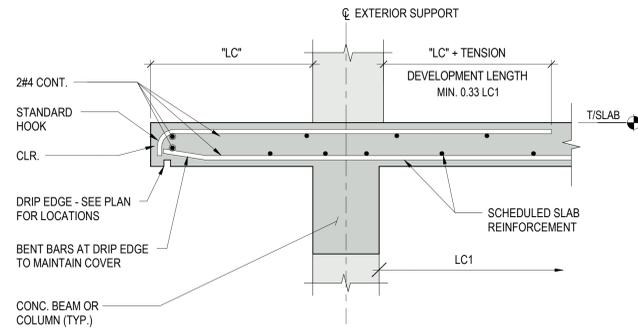


02 - EXTERIOR SUPPORT BARS

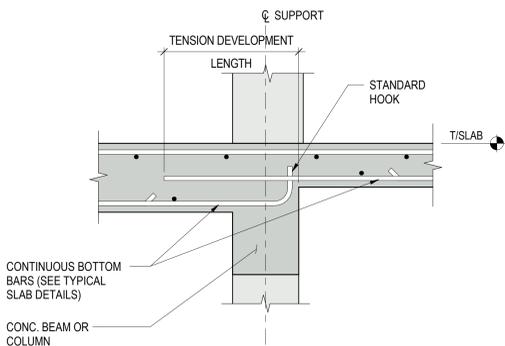
- NOTES:
 1. L' = GREATER OF LC1 OR LC2 (CLEAR DISTANCES FACE TO FACE OF SUPPORT)
 2. AT INTERIOR SUPPORT (CONTINUOUS END) PROVIDE LARGER SIZE AND NUMBER OF TOP BARS FROM ADJACENT SPANS.

ONE-WAY SLAB SCHEDULE (S)						
MARK	THICKNESS (IN)	REINFORCING				REMARKS
		TOP BARS EXT. SUPPORT	TOP BARS INT. SUPPORT	BOTTOM BARS	TEMP. TOP & BOT.	

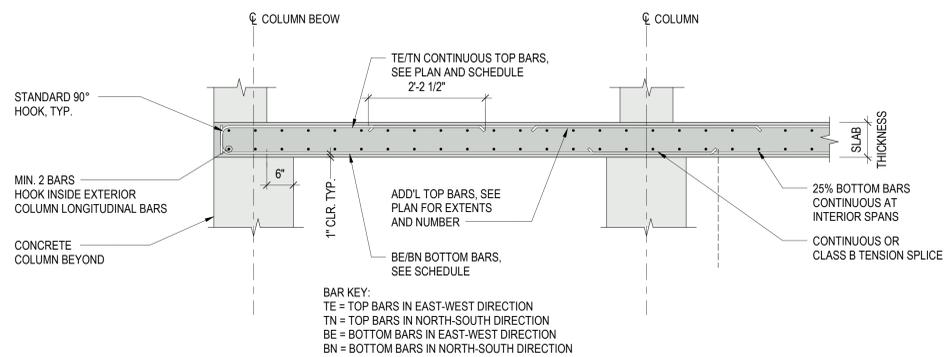
1 TYPICAL ONE-WAY SLAB
NOT TO SCALE



2 TYPICAL CANTILEVER SLAB EDGE DETAIL 1
NOT TO SCALE



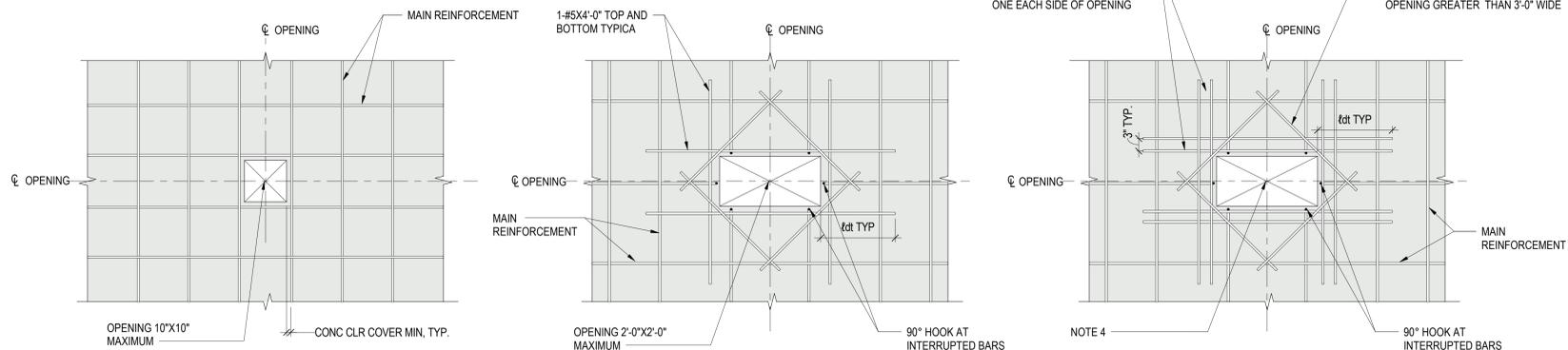
3 TYPICAL DETAIL AT CHANGE OF SLAB THICKNESS 1
NOT TO SCALE



- NOTES:
 1. AT INTERIOR SUPPORT (CONTINUOUS END) PROVIDE LARGER SIZE AND NUMBER OF TOP BARS FROM ADJACENT SPANS.

TWO-WAY SLAB SCHEDULE (SS)				
MARK	SLAB THICKNESS (IN)	REINFORCING		REMARKS
		TOP (TE/TN)	BOTTOM (BE/BN)	
SS1A	8	#5@12	#5@12	

4 TYPICAL TWO-WAY SLAB
NOT TO SCALE



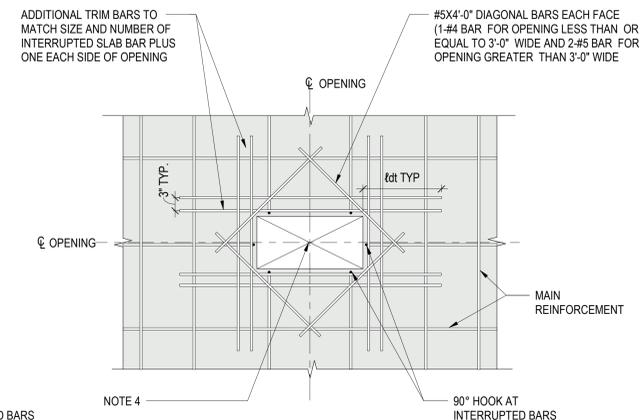
A RECTANGULAR OPENING NOT INTERRUPTING MAIN REINF.

B RECTANGULAR OPENING (UP TO 2')

C RECTANGULAR OPENING (BETWEEN 2' AND 6')

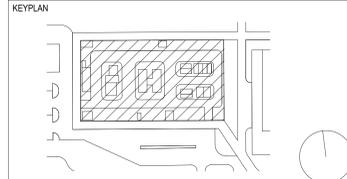
- NOTES:
 1. AT AREAS WHERE TRIM REINFORCEMENT CONGESTION OCCURS, SUCH AS AT OPENINGS NEAR WALL CORNERS AND BETWEEN CLOSELY SPACED OPENINGS, SPACE VERTICAL TRIM BARS NO LESS THAN 3" O.C. TO ACHIEVE THE AMOUNT REQUIRED. IF, DUE TO SPACE CONSTRAINTS, 3" O.C. MIN. CANNOT BE ACHIEVED, VERTICAL TRIM BARS EXCEEDING THE 3" O.C. MIN. MAY BE DELETED. NUMBER OF HORIZONTAL TRIM BARS CANNOT BE REDUCED.
 2. SEE PLANS FOR ADDITIONAL REINFORCEMENT AT SLAB OPENINGS LARGER THAN 6'-0"
 3. MIN DIMENSION BETWEEN OPENINGS IS: FOR SLAB: THE LARGEST DIMENSION OF OPENINGS. FOR WALL: TWO TIMES THE LARGEST DIMENSION OF OPENINGS.
 4. OPENING 6'-0"X6'-0" MAXIMUM. FOR SHEAR WALL, OPENING 3'-0"X3'-0" MAXIMUM.
 5. DETAILS APPLY AT ALL SLAB BLOCKOUTS REQUIRED FOR COLUMN BASE PLATE.

5 TYPICAL RECTANGULAR SLAB OPENINGS
NOT TO SCALE



C RECTANGULAR OPENING (BETWEEN 2' AND 6')

TACTICAL TRAINING DESIGN
Tactical Design North
 231 E. Buffalo St #502, Milwaukee, WI 53202
 LOCAL ARCHITECT
Jacobs Wyper Architects
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 STRUCTURAL ENGINEER
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 250 Greenwich St, New York, NY 10007
 ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER
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Hopkins Foodservice Specialists, Inc.
 7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818
 COST ESTIMATING
AECOM
 1700 Market St, Suite 1600, Philadelphia, PA 19103



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1	07 JUL 2023	ADDENDUM 31			

ENGINEER
BONGHWAN KIM
 ENGINEER
 PROFESSIONAL SEAL
 PENNSYLVANIA
 SIGNATURE DATE

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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

VERIFY SCALE

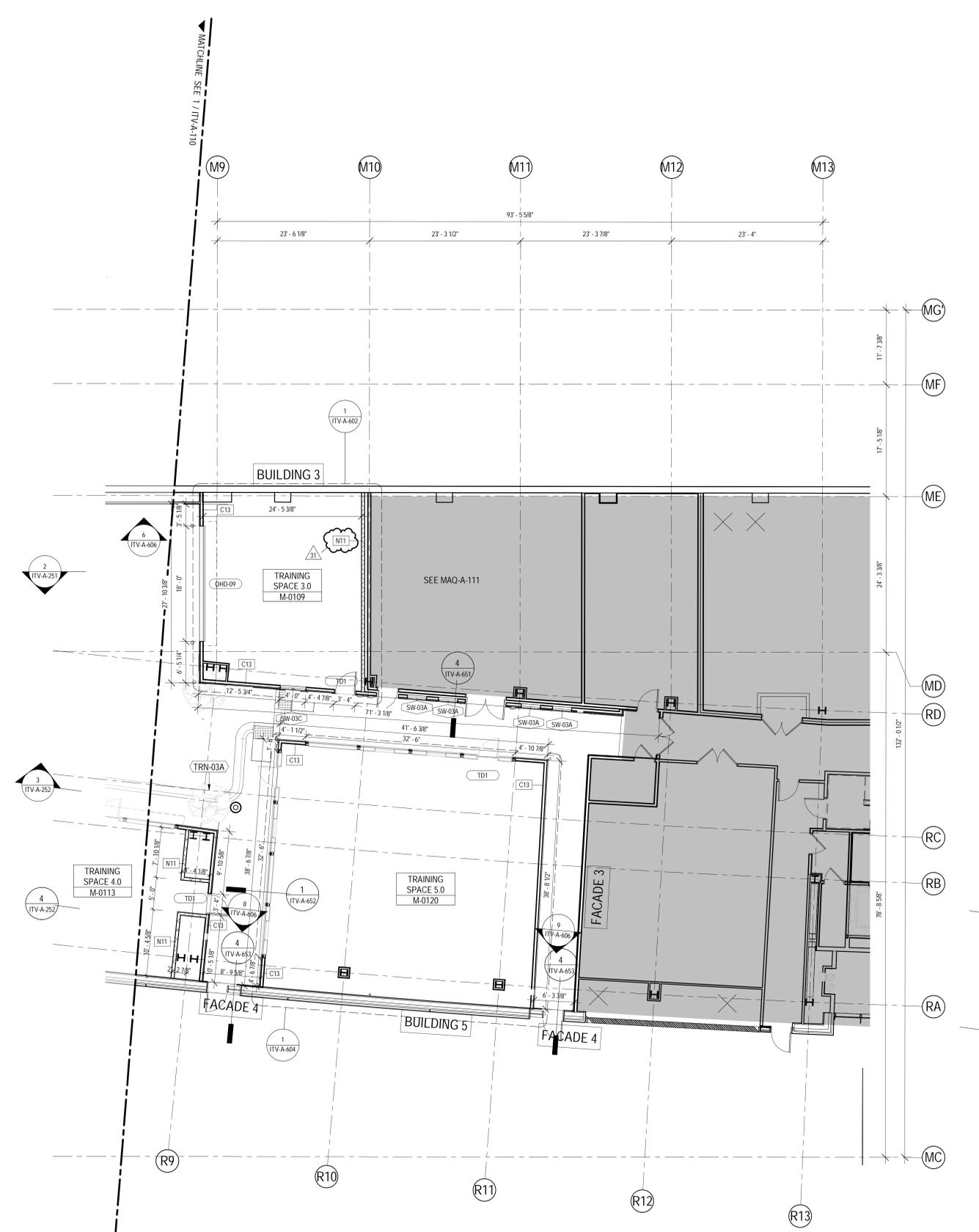
BAR IS ONE (1) INCH LONG
 ON ORIGINAL DRAWING: 1

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.

SHEET No. **GEN-S-410**

DRAWN BY: Author
 CHECKED BY: Checker
 DATE: []
 SCALE: AS NOTED



1 FLOOR PART PLAN - LEVEL 0B1
 SCALE: 1/8" = 1'-0" 0 4'-0" 8'-0" 16'-0" 32'-0"

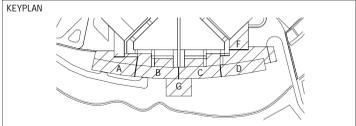
LEGEND

- FIRE RATINGS**
- 1/2 HOUR FIRE RATING
 - 1 HOUR FIRE RATING
 - 2 HOUR FIRE RATING
 - 3 HOUR FIRE RATING
- ▨ SCOPE REFERENCE HATCH
- ▨ MILLWORK
- B.P. BUILDING BASE POINT
- ⊕ W.P. WORK POINT
- XX --- DRAWING NOTE
- XX --- PARTITION TYPE
- XX --- INDICATES COLD-FORMED METAL FRAMING

GENERAL NOTES

1. ALL BUILDING ELEVATIONS ARE REFERENCED TO THE BUILDING REFERENCE DATUM. ELEVATION 0'-0". REFER TO GEN-G-100 FOR NAVD 88 DATUMS FOR EACH BUILDING.
2. REFER TO GEN-G-100 FOR GENERAL NOTES AND ADAPTABILITY GENERAL NOTES AND REQUIREMENTS.
3. REFER TO GEN-G-101 FOR ACCESSIBILITY AND ADAPTABILITY GENERAL NOTES AND REQUIREMENTS.
4. REFER TO GEN-G-102 FOR SYMBOLS, ABBREVIATIONS AND LEGENDS.
5. REFER TO GEN-G-103 MOUNTING HEIGHTS, REFER TO GEN-G-104 FOR MATERIAL LISTS AND EQUIPMENT LISTS.
6. REFER TO LS SERIES FOR CODE ANALYSIS AND REQUIRED WALL FIRE RATINGS.
7. REFER TO SITE DRAWINGS FOR SITE ORIGIN AND BUILDING ORIGIN POINTS.
8. REFER TO GEN-G-500 FOR EXTERIOR WALL ASSEMBLIES.
9. REFER TO GEN-G-730 FOR WINDOW SCHEDULES.
10. REFER TO GEN-G-710 - 712 FOR PARTITION SCHEDULES.
11. REFER TO GEN-G-715 - 719 FOR TYPICAL PARTITION DETAILS.
12. REFER TO GEN-G-715 - 719 FOR TYPICAL PARTITION DETAILS.
13. ALL SLAB PENETRATIONS FOR PIPES, CONDUITS, ETC. OUTSIDE OF RATED SHAFTS ARE TO BE FIRESAFED TO MATCH THE RATING OF THE SLAB.
14. ALL PENETRATIONS THROUGH RATED WALL ASSEMBLIES ARE TO HAVE A FIRESTOP ASSEMBLY SYSTEM TO MATCH THE RATING OF THE WALL.
15. THE PRECISE NUMBER, SIZE AND LOCATION OF ALL HOUSEKEEPING PADS REQUIRED TO SUPPORT OR MAINTAIN MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION EQUIPMENT SHALL BE CONFIRMED WITH THE EQUIPMENT SUPPLIER.
16. ALL STRUCTURAL MEMBERS SHALL BE FIRE-PROOFED IN ACCORDANCE WITH THE NOTES ON GEN-G-100.
17. PARTITIONS AT PERIMETER OF ALL TOILET ROOMS/JANITORS' CLOSETS ADJACENT TO MECHANICAL SHAFTS AND AT ALL LAUNDRY ROOMS/MECHANICAL ROOMS WITH WATER SHALL HAVE A CURB. AT GYPSUM PARTITIONS PROVIDE A 6" X 6" CURB. WHERE AT MASONRY WALLS, PROVIDE 6" TALL CURBS WITH WIDTH TO MATCH MASONRY ASSEMBLY.
18. ALL DOORS TO BE INSTALLED 4" ON HINGE SIDE FROM PERPENDICULAR PARTITIONS U.O.A.
19. FLOOR PLANS ARE CUT 4'-0" AFF TYPICAL.
20. INTERIOR LAYOUT DIMENSIONS ARE SHOWN TO FINISHED FACE OF CURB U.O.A.
21. PROVIDE SUPPLEMENTAL FRAMING, BLOCKING AND BRACING WHERE REQUIRED FOR WALL MOUNTED FIXTURES AND EQUIPMENT AT CURB WALL.

DRAWING NOTES



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
31	7 JUL 2023	ADDENDUM #31			
1	19 MAY 2023	ISSUED FOR BID			

KEYNOTES

ARCHITECT

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 Skidmore, Owings & Merrill LLP
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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

VERIFY SCALE

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SHEET No. **ITV-A-111**

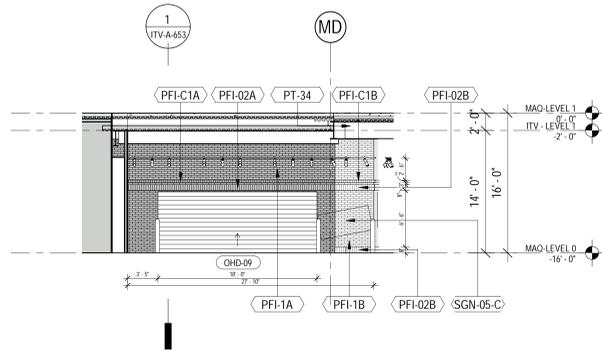
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TDN	TDN	MAY 2023	AS NOTED

FLOOR PART PLAN - LEVEL 0B1

FLOOR PART PLAN B - LEVEL 0

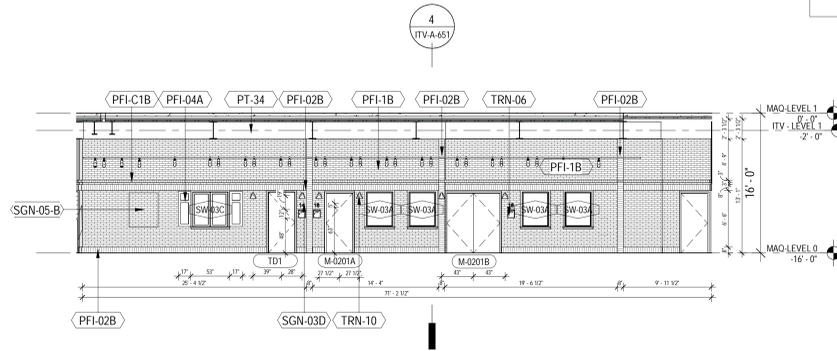
3 BUILDING 3 - WEST ELEVATION

SCALE: 1/8" = 1'-0" 0 4'-0" 8'-0" 16'-0" 32'-0"



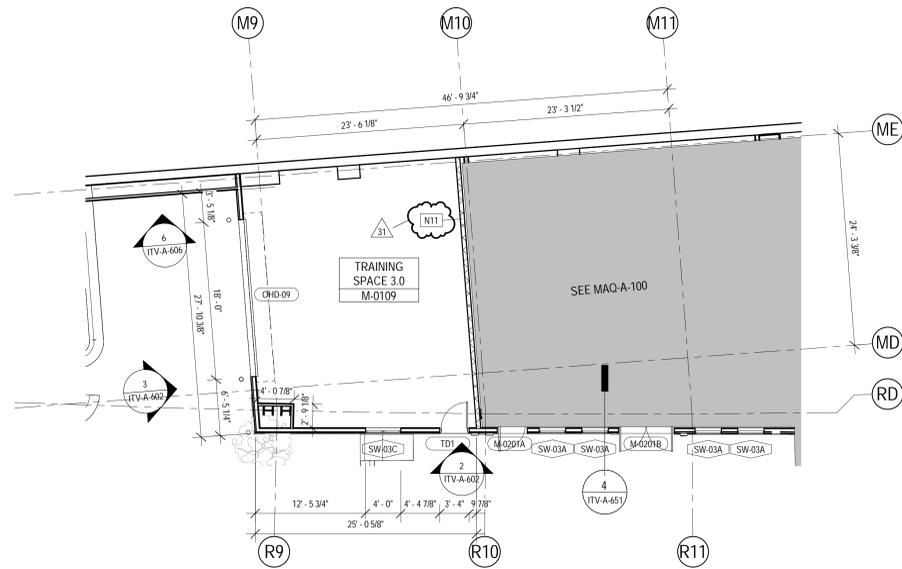
2 BUILDING 3 - SOUTH ELEVATION

SCALE: 1/8" = 1'-0" 0 4'-0" 8'-0" 16'-0" 32'-0"



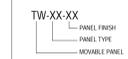
1 BUILDING 3 FLOOR PLAN - LEVEL 0

SCALE: 1/8" = 1'-0" 0 4'-0" 8'-0" 16'-0" 32'-0"

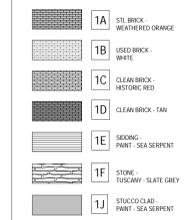


PANEL LEGEND

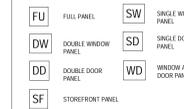
TACTICAL WALL PANEL TAG



FINISH TYPES (PFI)



PANEL TYPES



LEGEND ENLARGED PLAN/ELEV

FIRE RATINGS



DRAWING NOTE

1	SWITCH	SINGLE 1A	DOUBLE 1B	QUAD 1C	CONTROL 1D
2	ELECTRICAL OUTLET	SINGLE 2A	DUPLEX 2B	QUAD 2C	
3	DATA OUTLET	2 PORT 3A	4 PORT 3B	AV 3C	
4	FIRE ALARM STROBE	4			
5	THERMOSTAT	5			
6	WALL CLOCK	6			
7	PULL STATION	7			
8	SECURITY CAMERA	8			
9	CARD READER	9			
10	ADA PUSH BUTTON	10			
11	FLOOR BOX	11A	11B	11C	11D
12	WAP	12			

GENERAL NOTES

- ALL DIFFUSERS, REGISTERS AND GRILLES ARE BY THE 2 HVAC CONTRACTOR AND ARE SHOWN FOR LOCATION AND COORDINATION ONLY. UNO.
- ALL PLUMBING FIXTURES, SPRINKLERS, FIHS, AND STANDPIPES AND RELATED EQUIPMENT ARE BY THE 4 PLUMBING CONTRACTOR AND ARE SHOWN FOR LOCATION AND COORDINATION ONLY. UNO.
- 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.
- REFERENCE GEN-G-103 FOR STANDARD MOUNTING HEIGHTS AND DETAILS.
- REFERENCE ALSO POWER COMMUNICATIONS AND FINISH PLANS AND GEN-G-103 FOR STANDARD DEVICE MOUNTING ARRANGEMENTS, ALIGNMENTS AND DIMENSIONAL INFORMATION.
- ALIGN WALL TILE JOINTS TO FLOOR TILE JOINT LINES.
- CONFIRM FINAL TILE JOINT LAYOUT WITH PROFESSIONAL PRIOR TO INSTALLATION.

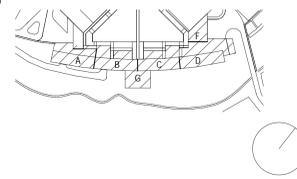
DRAWING NOTES

(SGN-XXX) SEE FIN-TLS ITV-A-714-FIN-T15 FOR SIGNAGE DETAILS

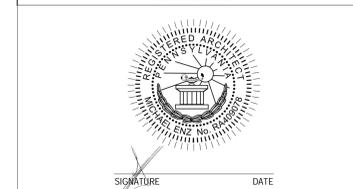
KEYNOTES

PFI-1A	066000	FAUX BRICK FINISH 1A
PFI-1B	066000	FAUX BRICK FINISH 1B
PFI-02A	066000	FAUX BRICK SOLDIER TRIM 1A
PFI-02B	066000	FAUX BRICK SOLDIER TRIM 1B
PT-34	099100	PAINT FINISH
TRN-06	119030	MOCK MAILBOX
TRN-10	119030	MOCK LIGHTING FIXTURE

KEYPLAN



31	7 JUL 2023	ADDENDUM #31			
1	19 MAY 2023	ISSUED FOR BID			
NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
RECORD REVISIONS					



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

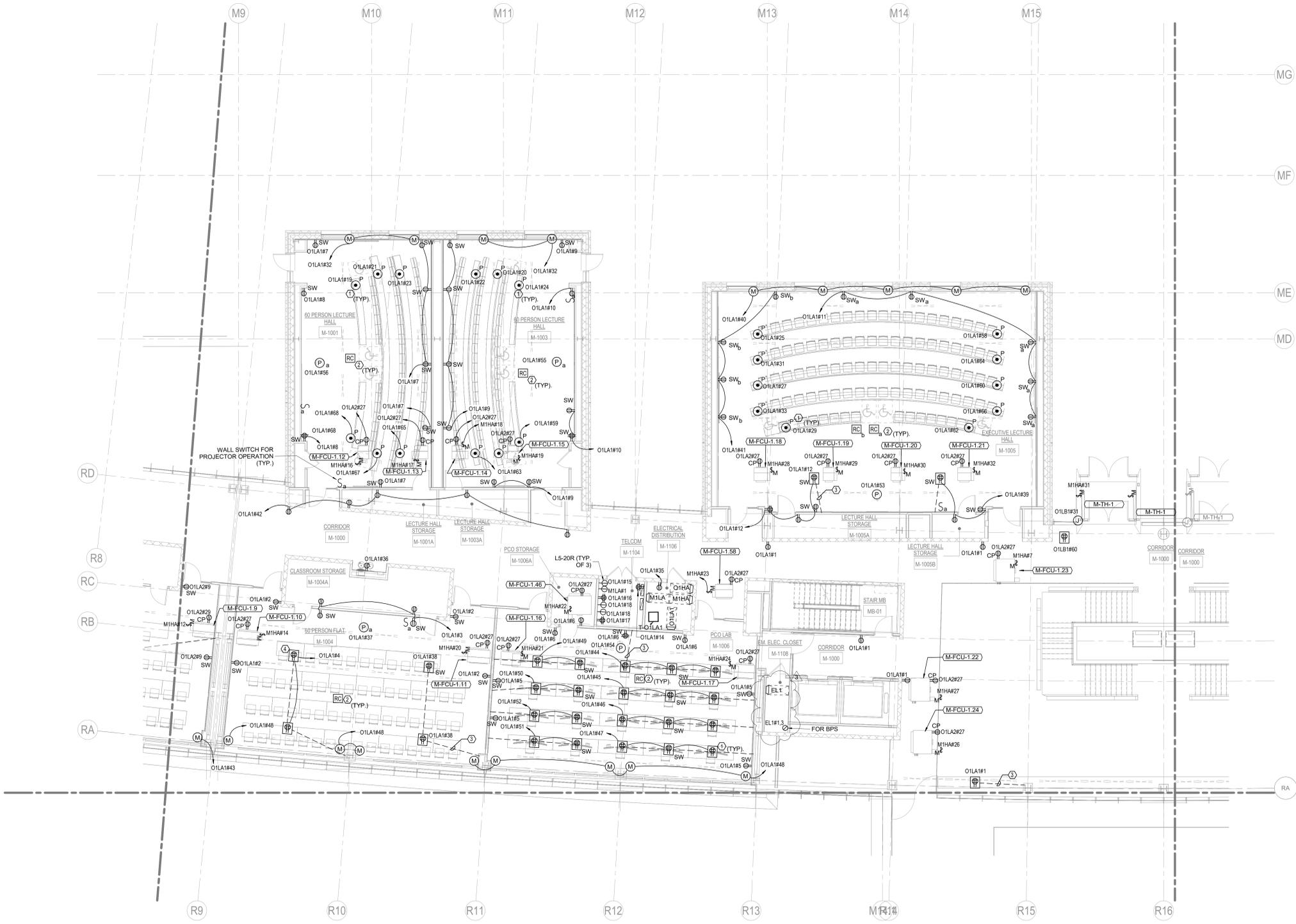
VERIFY SCALE

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SHEET No. **ITV-A-602**

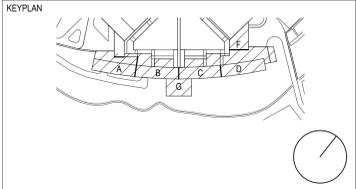
DRAWN BY	CHECKED BY	DATE	SCALE
TDN	TDN	MAY 2023	AS NOTED



1 FLOOR PART PLAN B - LEVEL 1 - ELECTRICAL SYSTEMS
 SCALE: 1/8" = 1'-0"
 0 16'-0" 32'-0" 64'-0" 128'-0"

- GENERAL NOTES**
- REFER TO MAQ-E-601 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
 - REFER TO MAQ-E-601 FOR PANEL SCHEDULES.
 - REFER TO GEN-E-701 FOR DETAILS.
 - NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.
- SHEET NOTES MAQ-E-121
- NOTE#** SHEET NOTE TEXT
- FLOOR BOX CONTRACTOR SHALL COORDINATE WITH POWERED FURNITURE.
 - CONTRACTOR SHALL VERIFY THE NUMBER OF POWER PACKS NEEDED TO PROVIDE A COMPLETE WORKING SWITCHED RECEPTACLE SYSTEM WITH LIGHTING CONTROLS. VENDOR PROVIDE POWER TO POWER PACK FROM CONTROLLED CIRCUIT WITH #12-#16 IN 3/4" CONDUIT. REFER TO DETAIL 2 ON SHEET GEN-E-705 FOR SWITCHED RECEPTACLE WIRING.
 - PROVIDE 1" CONDUIT FOR POWER PER CIRCUIT IN TRENCH AND RUN FROM FLOORBOX TO ADJACENT WALL. TERMINATE CONDUITS IN CEILING. COORDINATE EXACT ROUTING IN FIELD. BACKFILL AND FINISH TO MATCH THE ADJACENT SURFACE.
 - CONTRACTOR SHALL TRENCH AS REQUIRED FOR ALL FLOOR BOXES ADDED TO THE SPACE.

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	
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MECHANICAL AVIT ENGINEER	
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ACOUSTICAL ENGINEER	
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CODE CONSULTANT	
CCI 215 W 40th St, 10th Floor, New York, NY 10018	
CIVIL ENGINEER	
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VERTICAL TRANSPORT	
Michael Blades & Associates Ltd. 5409 Rapiand Ct, Lothian, MD 20711	
SIGNAGE CONSULTANT	
Patricia Hord Graphik Design 119 S. St. Asaph St, Alexandria, VA 22314	
LANDSCAPE	
Lee and Associates, Inc. 6381 Street NW, Washington, DC 20001	
LIGHTING	
MCLA 1000 Potomac 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	



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3	07 JUL 2023	ADDENDUM 31			
1	19 MAY 2023	ISSUED FOR BID			

RECORD REVISIONS

Jitendra K. Agarwal
 SIGNATURE DATE 2023-06-16

ARCHITECT

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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

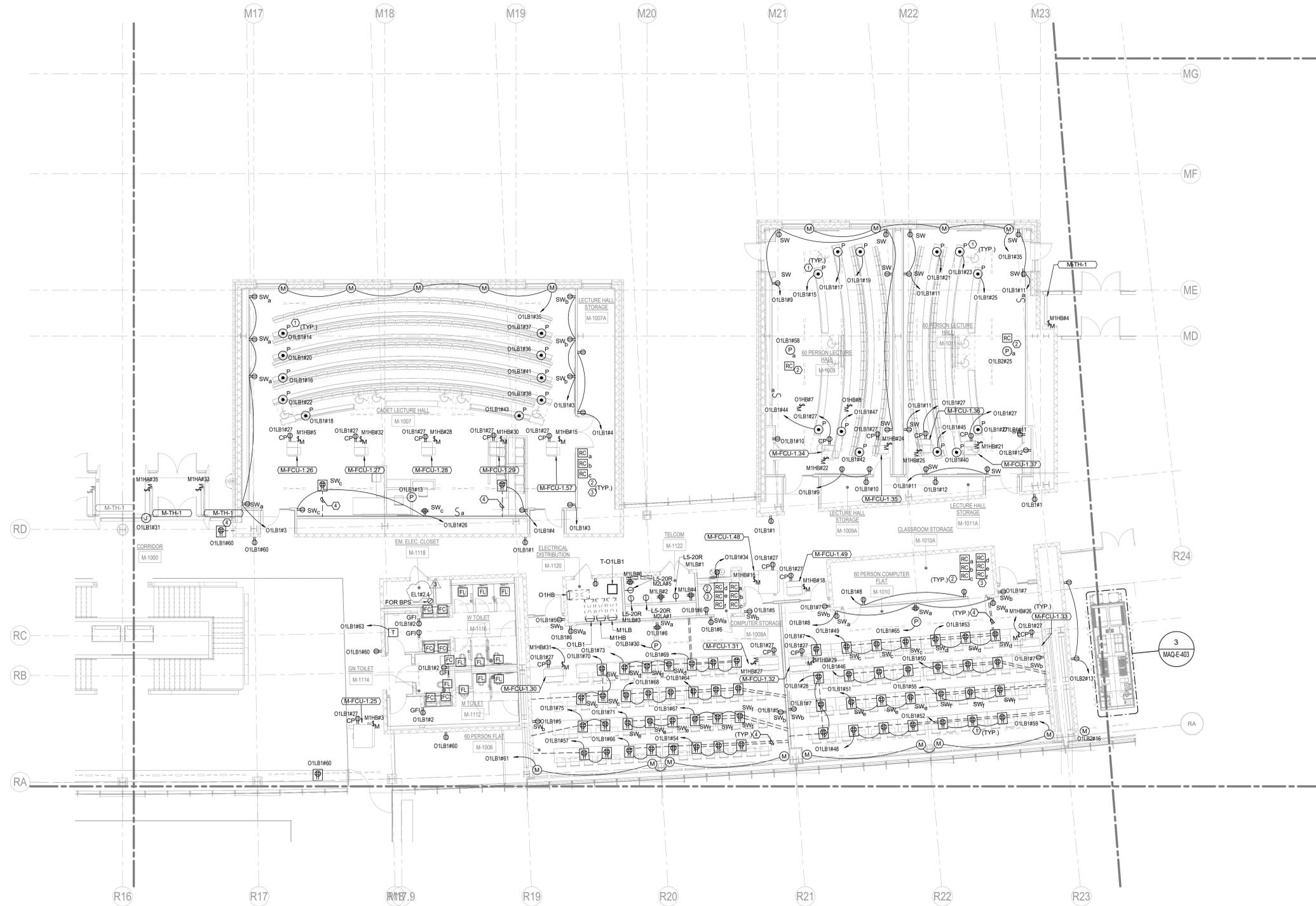
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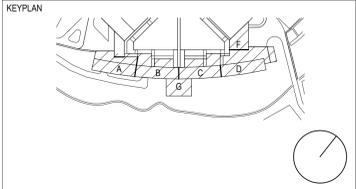
DRAWN BY BP	CHECKED BY MK	DATE	SCALE AS NOTED
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1 FLOOR PART PLAN C - LEVEL 1 - ELECTRICAL SYSTEMS
 SCALE: 1/8" = 1'-0"
 0 16'-0" 32'-0" 64'-0" 128'-0"

- GENERAL NOTES**
- REFER TO MAQ-E-601 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
 - REFER TO MAQ-E-601 FOR PANEL SCHEDULES.
 - REFER TO GEN-E-701 FOR DETAILS.
 - NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.
 - ALL CIRCUITS ON THIS SHEET SHALL BE CIRCUITED TO PANEL "OLE1" U.O.N.
- SHEET NOTES MAQ-E-122
- NOTES**
- FLOOR BOX CONTRACTOR SHALL COORDINATE WITH POWERED FURNITURE.
 - CONTRACTOR SHALL VERIFY THE NUMBER OF POWER PACKS NEEDED TO PROVIDE A COMPLETE WORKING SWITCHED RECEPTACLE SYSTEM WITH LIGHTING CONTROLS VENDOR. PROVIDE POWER TO POWER PACK FROM CONTROLLED CIRCUIT WITH #12-14125 IN 3/4" CONDUIT. REFER TO DETAIL 2 ON SHEET GEN-E-705 FOR SWITCHED RECEPTACLE WIRING.
 - CONTRACTOR SHALL COORDINATE LOCATION OF POWER PACKS FOR SWITCHED RECEPTACLES WITH OTHER TRADES.
 - PROVIDE 1" CONDUIT FOR POWER PER CIRCUIT IN TRENCH AND RUN FROM FLOORBOX TO ADJACENT WALL. TERMINATE CONDUITS IN CEILING. COORDINATE EXACT ROUTING IN FIELD. BACKFILL AND FINISH TO MATCH THE ADJACENT SURFACE.

Tactical Design North, Inc. 231 E. Buffalo St #502, Milwaukee, WI 53202	
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Aqua Design International 7536 N. La Cholla Blvd Tucson, AZ 85741	



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1	19 MAY 2023	ISSUED FOR BID			

RECORD REVISIONS

COMMONWEALTH OF PENNSYLVANIA
 REGISTERED PROFESSIONAL ENGINEER
MITENDRA K AGARWAL
 ENGINEER (PROJ53174E)
 SIGNATURE: [Signature] DATE: 2023-06-16

ARCHITECT
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COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF GENERAL SERVICES
 HARRISBURG, PENNSYLVANIA

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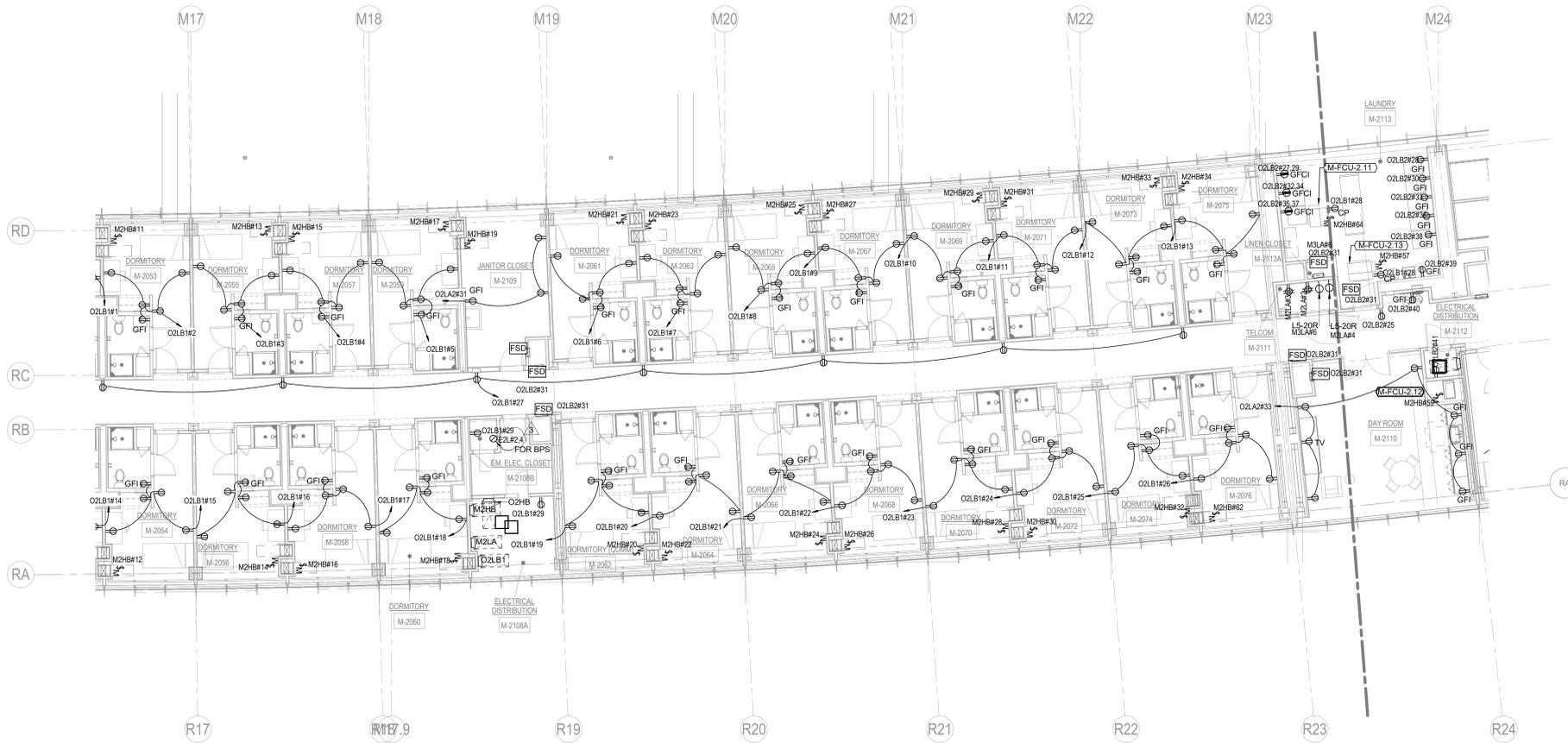
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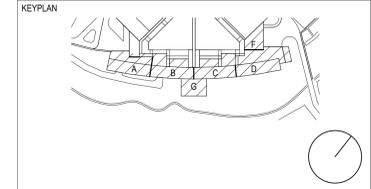
SHEET No: **MAQ-E-122**

DRAWN BY: BP	CHECKED BY: MK	DATE:	SCALE: AS NOTED
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1 FLOOR PART PLAN C - LEVEL 2 - ELECTRICAL SYSTEMS
 SCALE: 1/8" = 1'-0"
 0 16'-0" 32'-0" 64'-0" 128'-0"

- GENERAL NOTES**
- REFER TO MAQ-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
 - REFER TO MAQ-E-001 FOR PANEL SCHEDULES.
 - REFER TO GEN-E-701 FOR DETAILS.
 - NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.
- 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 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 CONSULTANT
- 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 Potomac 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



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	07 JUL 2023	ADDENDUM 31			
1	19 MAY 2023	ISSUED FOR BID			

REGISTERED PROFESSIONAL ENGINEER
JITENDRA K AGARWAL
 ENGINEER
 PESS31786
 PENNSYLVANIA

2023-06-16
 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: 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.

SHEET No.
MAQ-E-132

DRAWN BY BP	CHECKED BY MK	DATE	SCALE AS NOTED
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GENERAL NOTES

- REFER TO MAQ-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
- REFER TO MAQ-E-001 FOR PANEL SCHEDULES.
- REFER TO GEN-E-701 FOR DETAILS.
- NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.

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, 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

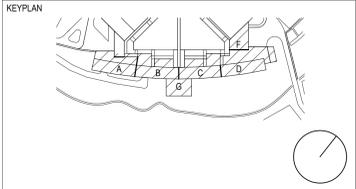
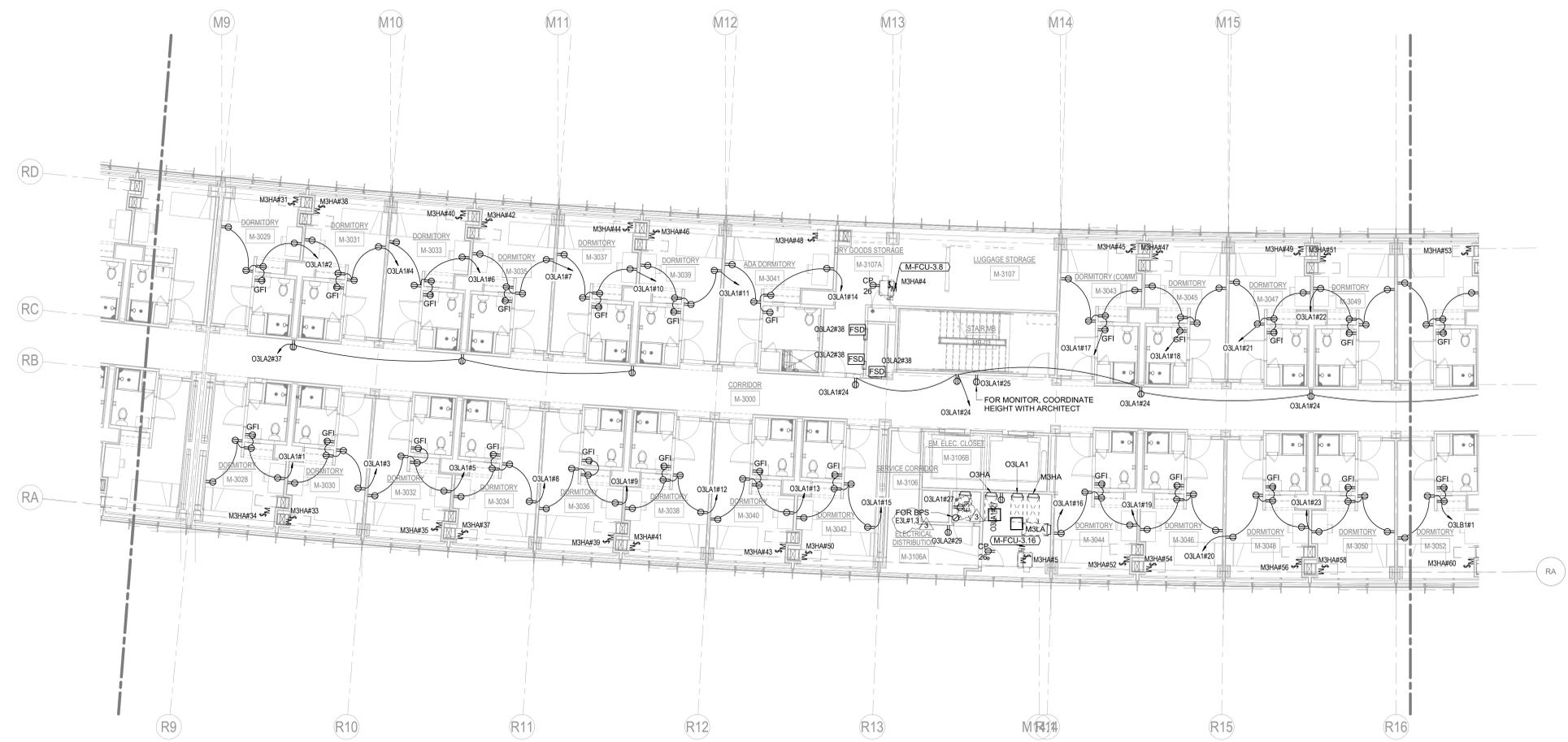
MCLA
1000 Potomac St NW, Suite 121, Washington, DC 20007

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



RECORD REVISIONS			
NO.	DATE	DESCRIPTION	NO. DATE DESCRIPTION
3	07 JUL 2023	ADDENDUM 31	
1	19 MAY 2023	ISSUED FOR BID	

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
JITENDRA K AGARWAL
ENGINEER
PROFESSOR
PENNSYLVANIA

Signature: *J. Agarwal* Date: 2023-06-16

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

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SHEET No. **MAQ-E-141**

DRAWN BY BP	CHECKED BY MK	DATE	SCALE AS NOTED
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1 FLOOR PART PLAN B - LEVEL 3 - ELECTRICAL SYSTEMS

SCALE: 1/8" = 1'-0"

0 16'-0" 32'-0" 64'-0" 128'-0"

GENERAL NOTES

- REFER TO MAQ-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
- REFER TO MAQ-E-001 FOR PANEL SCHEDULES.
- REFER TO GEN-E-701 FOR DETAILS.
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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, AVIT ENGINEER

Interface Engineering, Inc.
2000 M Street NW, Suite 270, Washington, DC 20036

ACOUSTICAL ENGINEER

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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

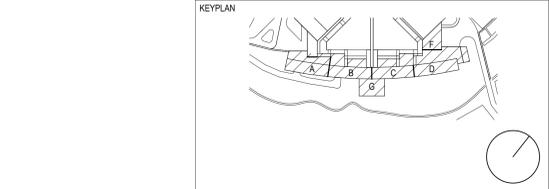
MCLA
1000 Potomac St NW, Suite 121, Washington, DC 20007

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



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
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REGISTERED PROFESSIONAL ENGINEER
PENNSYLVANIA
JITENDRA K AGARWAL
2023-06-16
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

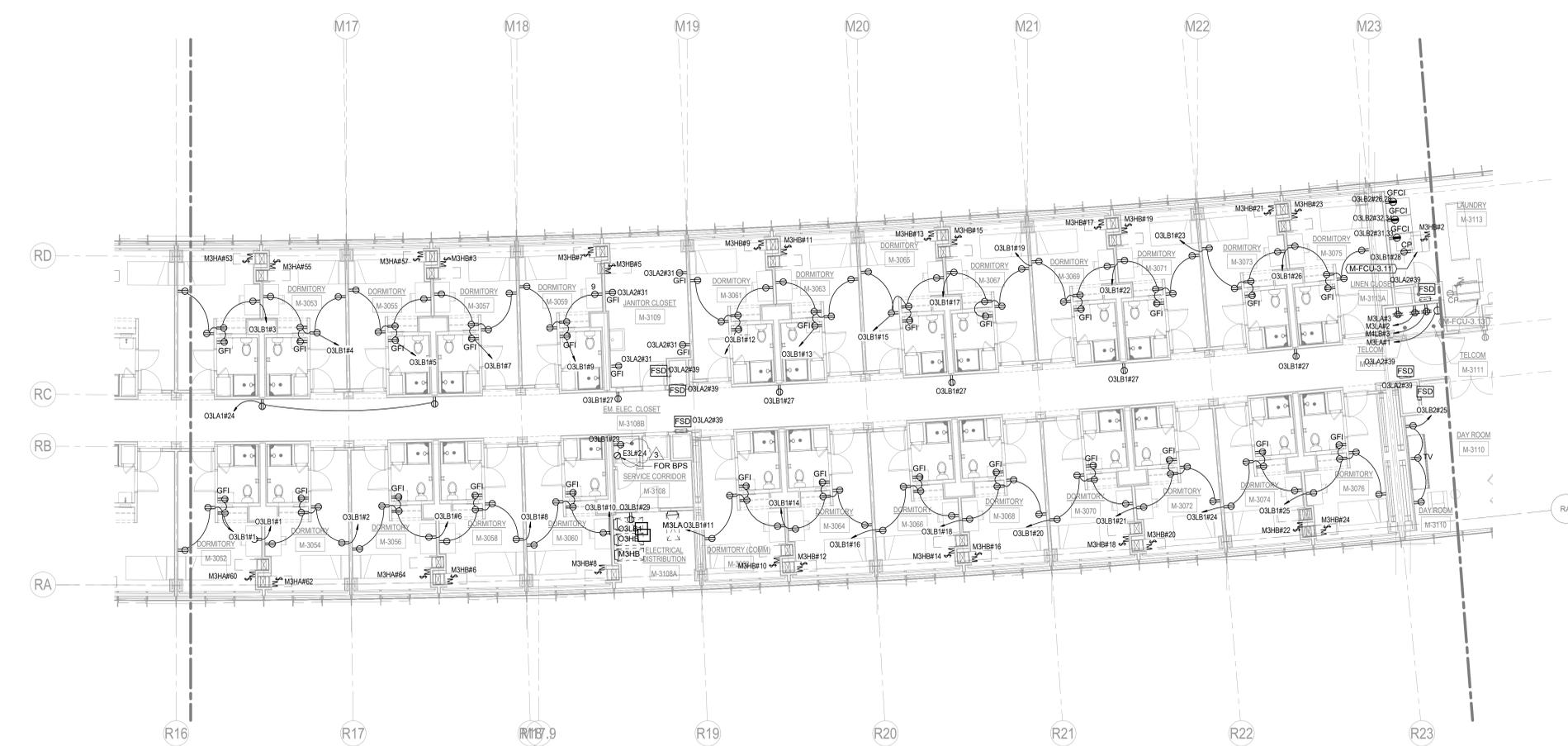
VERIFY SCALE

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SHEET No. **MAQ-E-142**

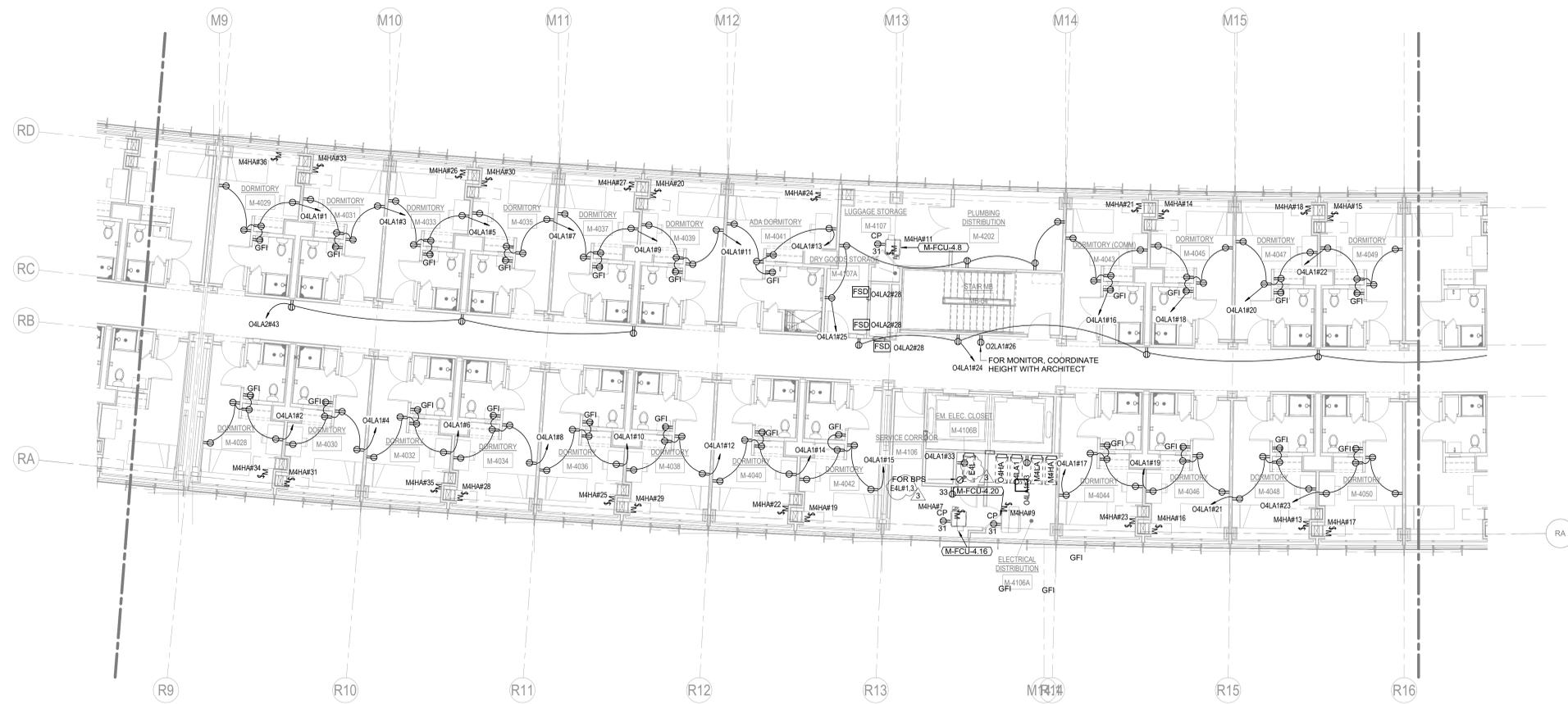
DRAWN BY **BP** CHECKED BY **MK** DATE AS NOTED



1 FLOOR PART PLAN C - LEVEL 3 - ELECTRICAL SYSTEMS

SCALE: 1/8" = 1'-0"

0 16'-0" 32'-0" 64'-0" 128'-0"



1 FLOOR PART PLAN B - LEVEL 4 - ELECTRICAL SYSTEMS

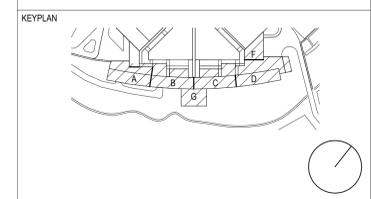
SCALE: 1/8" = 1'-0"
 0 16'-0" 32'-0" 64'-0" 128'-0"

GENERAL NOTES	
1. REFER TO MAQ-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.	TACTICAL TRAINING DESIGN
2. REFER TO MAQ-E-001 FOR PANEL SCHEDULES.	Tactical Design North, Inc. 231 E. Buffalo St #502, Milwaukee, WI 53202
3. REFER TO GEN-E-701 FOR DETAILS.	LOCAL ARCHITECT
4. NOTE THAT ALL NEW EXPOSED CABLES ABOVE THE CEILING SHALL BE PLENUM RATED.	Jacobs Wyper Architects 1232 Chancellor St, Philadelphia, PA 19107

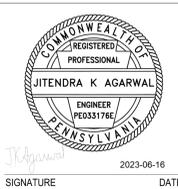
STRUCTURAL ENGINEER	Skidmore, Owings & Merrill LLP 250 Greenwich St, New York, NY 10007
ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER	A & J Consulting Engineering Services, P.C. 164 Brighton Rd, Clifton, NJ 07012
MECHANICAL AVIT ENGINEER	Interface Engineering, Inc. 2000 M Street NW, Suite 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. 6381 Street NW, Washington, DC 20001

LIGHTING	MCLA 1000 Potomac 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



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NO.	DATE	DESCRIPTION	NO. DATE DESCRIPTION
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1	19 MAY 2023	ISSUED FOR BID	



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		SHEET No.	
BAR IS ONE (1) INCH LONG	ON ORIGINAL DRAWING: 1	MAQ-E-151	
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY		DRAWN BY	CHECKED BY
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.		BP	MK
		DATE	SCALE
			AS NOTED

GENERAL NOTES

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- REFER TO MAQ-E-001 FOR PANEL SCHEDULES.
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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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SIGNAGE CONSULTANT

Patricia Hord Graphik Design
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LANDSCAPE

Lee and Associates, Inc.
6381 Street NW, Washington, DC 20001

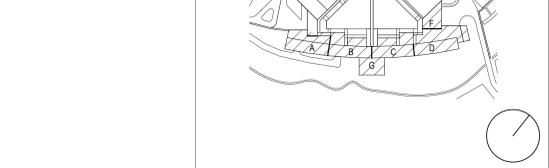
LIGHTING

MCLA
1000 Potomac St NW, Suite 121, Washington, DC 20007

FOOD SERVICE

Hopkins Foodservice Specialists, Inc.
7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
3	07 JUL 2023	ADDENDUM 31			
1	19 MAY 2023	ISSUED FOR BID			

REGISTERED PROFESSIONAL ENGINEER

JITENDRA K AGARWAL

ENGINEER

PRO3517942

PENNSYLVANIA

2023-06-16

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

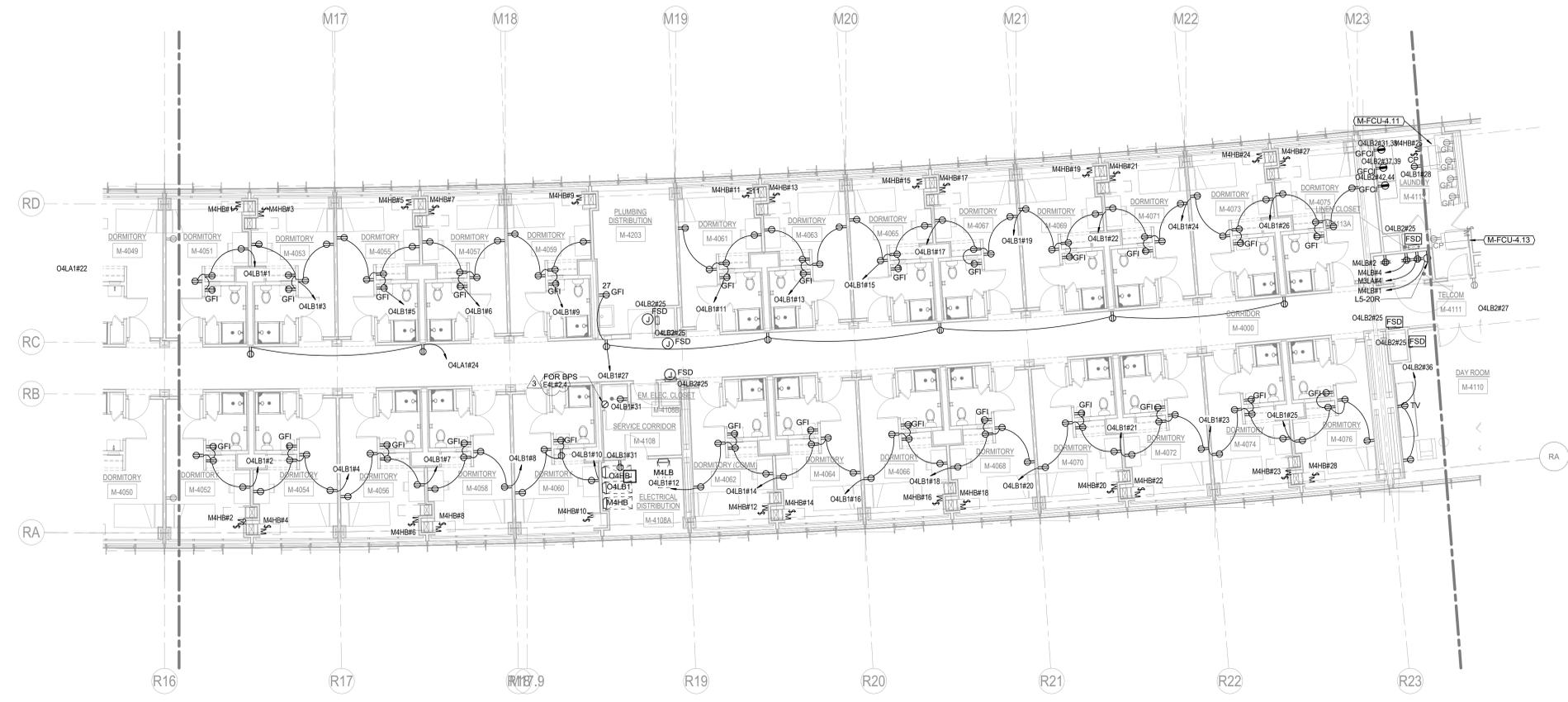
ON ORIGINAL DRAWING: 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

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SHEET No. **MAQ-E-152**

DRAWN BY **BP** CHECKED BY **MK** DATE SCALE **AS NOTED**



1 FLOOR PART PLAN C - LEVEL 4 - ELECTRICAL SYSTEMS

SCALE: 1/8" = 1'-0"

0 16'-0" 32'-0" 64'-0" 128'-0"

PANEL NAME: MGHB														
LOCATION: ELECTRICAL DISTRIBUTION M-0304				VOLT: 480/277 Wye				A.I.C. RATING: 22,000						
FED FROM: DP-MGH				PHASE: 3				MCB OR MLO: MCB						
MOUNTING STYLE: Surface				WIRE: 4				BUS RATING: 125A						
NEMA RATING: Type 1								MCB TRIP: 100 A						
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL	A	B	C	POL	OC	WIRE SIZE	LOAD DESCRIPTION	#		
1	M-FCU-0.26	2#12+1#12G	20 A	1	1634	1939		1	20 A	2#10+1#10G	M-DSB-3	2		
3	M-DSB-1	2#10+1#10G	20 A	1		1939	1939		1	20 A	2#10+1#10G	M-DSB-7	4	
5	M-DSB-8	2#12+1#12G	20 A	1		1939	1939		1	20 A	2#10+1#10G	M-DSB-9	6	
7	M-DSB-6	2#10+1#10G	20 A	1	1939	1939			1	20 A	2#10+1#10G	M-DSB-10	8	
9	M-DSB-11	2#12+1#12G	20 A	1		1939	700		1	20 A	2#12+1#12G	M-DSB12	10	
11	M-DSB-15	2#12+1#12G	20 A	1		1939	1939		1	20 A	2#12+1#12G	M-DSB-26	12	
13	M-DSB-16	2#12+1#12G	20 A	1	1939	1939			1	20 A	2#12+1#12G	M-FCU-0.25	14	
15	M-DSB-2	2#12+1#12G	20 A	1		1939	1939		1	20 A	2#12+1#12G	M-FCU-0.32	16	
17	M-DSB-14	2#12+1#12G	20 A	1			1939	1939	1	20 A	2#12+1#12G	M-FCU-0.33	18	
19	M-DSB-22	2#12+1#12G	20 A	1	700	0			1	20 A	--	SPARE	20	
21	FCU0.36	2#12+1#12G	20 A	1		700	0		1	20 A	--	SPARE	22	
23	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	24	
25	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	26	
27	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	28	
29	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	30	
31	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	32	
33	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	34	
35	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	36		
37	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	38		
39	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	40		
41	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	42		
TOTAL PHASE LOAD					12,029 VA	11,095 VA	11,634 VA							
TOTAL CONNECTED LOAD					42 A									
LOAD CLASSIFICATION														
Other		CONN. LOAD		DEMAND FACTOR		EST. DEMAND		TOTALS						
Other		34,758 VA		100.00%		34,758 VA		TOTAL CONN. LOAD... 34,758 VA						
Power								TOTAL EST. DEMAND... 34,758 VA						
								TOTAL CONN. AMPS: 42 A						
								TOTAL DEMAND AMPS: 42 A						

Branch Panel: MGLB														
LOCATION: ELECTRICAL DISTRIBUTION M-0304				Volts: 120/208 Wye				A.I.C. Rating: 10,000						
Supply From: DP-MGLB				Phase: 3				Mains Type: MCB						
Mounting: Surface				Wires: 4				Bussing: 60 A						
Enclosure: Type 1								Mains Rating: 30 A						
Feeder: SEE SINGLE LINE DIAGRAM														
Ckt No.	Circuit Description	Wire Size Text	Trip	Poles	A (VA)	B (VA)	C (VA)	Poles	Trip	Wire Size Text	Circuit Description	Ckt No.		
1	L5-20R REC M-0214	2#10+1#10G	20 A	1	180	180			1	20 A	2#10+1#10G	L5-20R REC M-0341	2	
3	5-20P REC M-0341	2#10+1#10G	20 A	1		360	360		1	20 A	2#10+1#10G	REC-M-0341	4	
5	CAB LTG DISC.	2#10+1#10G	30 A	1			2880	180	1	20 A	2#10+1#10G	REC-ELEV...	6	
7	L5-20R REC M-0341	2#12+1#12G	20 A	1	180	0			1	20 A	--	SPARE	8	
9	ELEVATOR SUMP PUMP	3#10+1#10G	30 A	3		800	0		1	20 A	--	SPARE	10	
11	SPARE	--	20 A	1	800	0			1	20 A	--	SPARE	12	
13	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	14	
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16	
17	SPARE	--	20 A	1				0	1	20 A	--	SPARE	18	
Total Load					1,340 VA	1,520 VA	3,860 VA							
Design Amp					19 A									
LOAD CLASSIFICATION														
Other		CONNECTED LOAD		DEMAND FACTOR		ESTIMATED DEMAND		Panel Totals						
Power		5,280 VA		100.00%		5,280 VA		Total Conn. Load: 6,720 VA						
Receptacle		1,440 VA		100.00%		1,440 VA		Total Est. Demand: 6,720 VA						
								Total Conn.: 19 A						
								Total Est. Demand: 19 A						

PANEL NAME: MGHC														
LOCATION: ELECTRICAL DISTRIBUTION M-0304				VOLT: 480/277 Wye				A.I.C. RATING: 22,000						
FED FROM: DP-MGH				PHASE: 3				MCB OR MLO: MCB						
MOUNTING STYLE: Surface				WIRE: 4				BUS RATING: 125A						
NEMA RATING: Type 1								MCB TRIP: 100 A						
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL	A	B	C	POL	OC	WIRE SIZE	LOAD DESCRIPTION	#		
1	M-CRAH-1	3#4+1#10G IN 1-1/4"	60 A	3	11686	700			1	20 A	2#12+1#12G	M-FCU-0.22	2	
3	M-FCU-0.21	2#12+1#12G	20 A	1	700	700			1	20 A	2#12+1#12G	M-FCU-0.19	4	
5	M-FCU-0.21	2#12+1#12G	20 A	1			11686	700	1	20 A	2#12+1#12G	M-FCU-0.20	6	
7	M-DSB-25	2#12+1#12G	20 A	1		1939	700		1	20 A	2#12+1#12G	M-FCU-0.18	8	
9	M-FCU-0.24	2#12+1#12G	20 A	1			700	700	1	20 A	2#12+1#12G	M-FCU-0.17	10	
11	M-DSB-24	2#12+1#12G	20 A	1	700	700			1	20 A	2#12+1#12G	M-DSB-18	12	
13	M-DSB-19	2#12+1#12G	20 A	1		700	700		1	20 A	2#12+1#12G	M-DSB-20	14	
15	D-DSB-23	2#12+1#12G	20 A	1			700	700	1	20 A	2#12+1#12G	M-DSV-21	16	
17	M-DSB-17	2#12+1#12G	20 A	1	700	0			1	20 A	--	SPARE	18	
21	ELEVATOR DISC.	3#4+1#10G	60 A	3		12470	0		1	20 A	--	SPARE	22	
23	SPARE	--	20 A	1			12470	0	1	20 A	--	SPARE	24	
25	SPARE	--	20 A	1	12470	0			1	20 A	--	SPARE	26	
27	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	28	
29	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	30	
31	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	32	
33	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	34	
35	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	36		
37	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	38		
39	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	40		
41	PREPARED SPACE	--	--	1					1	--	PREPARED SPACE	42		
TOTAL PHASE LOAD					28,356 VA	28,895 VA	27,656 VA							
TOTAL CONNECTED LOAD					102 A									
LOAD CLASSIFICATION														
Other		CONN. LOAD		DEMAND FACTOR		EST. DEMAND		TOTALS						
Other		12,439 VA		100.00%		12,439 VA		TOTAL CONN. LOAD... 84,906 VA						
Power		72,467 VA		100.00%		72,467 VA		TOTAL EST. DEMAND... 84,906 VA						
								TOTAL CONN. AMPS: 102 A						
								TOTAL DEMAND AMPS: 102 A						

SWB: MGHE														
LOCATION: MECHANICAL ROOM...				VOLTA: 480/277 Wye				A.I.C. RATING: 65,000						
FED FROM: DP-MGH				PHASE: 3				MLO/MCB: SWITCH AND FUSE						
MOUNTING: WALL MOUNTED				WIRE: 4				BUS RATING: 400 A						
NEMA RATING: NEMA-1														
#	LOAD DESCRIPTION	POLE #	OC	LOAD (VA)	FEEDER									
1	M-AHU-1-CKT-1	3	15 A	7,346 VA	3#10+1#10G IN 3/4"									
2	M-AHU-1-CKT-2	3	15 A	3,991 VA	3#10+1#10G IN 3/4"									
3	M-AHU-1-CKT-3	3	15 A	549 VA	3#10+1#10G IN 3/4"									
4	M-AHU-2	3	35 A	20,715 VA	3#6+1#6G IN 1"									
5	M-AHU-3	3	35 A	20,715 VA	3#6+1#6G IN 1"									
6	M-AHU-5	3	25 A	12,437 VA	3#10+1#10G IN 3/4"									
7	M-AHU-6	3	15 A	8,145 VA	3#10+1#10G IN 3/4"									
8	M-DOAS-1	3	40 A	22,659 VA	3#8+1#8G IN 3/4"									
9	M-DOAS-2	3	70 A	33,366 VA	3#4+1#8G IN 1 1/4"									
10	M-DOAS-3	3	40 A	21,985 VA	3#6+1#6G IN 1"									
11	M-DOAS-4	3	40 A	22,576 VA	3#8+1#8G IN 1"									
12	M-DOAS-5	3	20 A	11,371 VA	3#10+1#10G IN 3/4"									
13	M-SCWP-1	3	15 A	2,700 VA	3#12+1#12G IN 3/4"									
14	M-SCWP-2	3	15 A	2,700 VA	3#12+1#12G IN 3/4"									
15	SPARE	1	20 A	0 VA	--									
16	SPARE	1	20 A	0 VA	--									
17	SPARE	1	20 A	0 VA	--									
18	SPARE	1	20 A	0 VA	--									
19	SPARE	1	20 A	0 VA	--									
20	SPARE	1	20 A	0 VA	--									
21	SPARE	1	20 A	0 VA	--									
22	SPARE	1	20 A	0 VA	--									
23	SPARE	1	20 A	0 VA	--									
24	PREPARED SPACE	1	--	--	--									
25	PREPARED SPACE	1	--	--	--									
26	PREPARED SPACE	1	--	--	--									
27	PREPARED SPACE	1	--	--	--									
28	PREPARED SPACE	1	--	--	--									
29	PREPARED SPACE	1	--	--	--									
30	PREPARED SPACE	1	--	--	--									
TOTAL CONNECT LOAD					191,264 VA									
TOTAL CONNECTED AMPS					230 A									
LOAD CLASSIFICATION														
Other		CONNECTED...		DEMAND FACTOR		ESTIMATED...								

OPTIONAL STAND-BY PANEL SCHEDULES

PANEL NAME: LC-118E

LOCATION: HOT LINE SERVING M-1205B
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: Type 1

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 100 A
MCB TRIP: 100 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	HOT COLD DROP IN	2#10+1#10G	30 A	1	2520	288		1	20 A	2#12+1#12G	FROST TOP	2	
3	DROP IN COLD WELL	2#12+1#12G	20 A	1		444	750	1	20 A	2#12+1#12G	HEAT LAMP EAST	4	
5	FOOD LIGHTS EAS...	2#12+1#12G	20 A	1			150	1632	1	20 A	2#12+1#12G	FOOD GUARDS WIT...	6
7	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	14
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16
17	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	18
TOTAL PHASE LOAD			2,808 VA		1,194 VA		1,782 VA						
TOTAL CONNECTED LOAD													
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS							
Receptacle			5,784 VA	100.00%	5,784 VA								
						TOTAL CONN. LOAD...	5,784 VA						
						TOTAL EST. DEMAND...	5,784 VA						
						TOTAL CONN. AMPS:	16 A						
						TOTAL DEMAND AMPS:	16 A						

Notes:

PANEL NAME: LC-118W

LOCATION: LINE UP AREA M-1203A
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: Type 1

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 100 A
MCB TRIP: 100 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	FOOD LIGHT WEST 1	2#12+1#12G	20 A	1	150	750		1	20 A	2+12+1#12G	HEAT LAMP WITH...	2	
3	DROP IN COLD WE...	2#12+1#12G	20 A	1		444	288	1	20 A	2#12+1#12G	FROST TOP	4	
5	FOOD GUARD...	2#12+1#12G	20 A	1			1632	2520	1	30 A	2#10+1#10G	HOT COLD DROP IN	6
7	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	14
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16
17	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	18
TOTAL PHASE LOAD			900 VA		732 VA		4,152 VA						
TOTAL CONNECTED LOAD			16 A										
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS							
Receptacle			5,784 VA	100.00%	5,784 VA								
						TOTAL CONN. LOAD...	5,784 VA						
						TOTAL EST. DEMAND...	5,784 VA						
						TOTAL CONN. AMPS:	16 A						
						TOTAL DEMAND AMPS:	16 A						

Notes:

PANEL NAME: LC-128.1

LOCATION: BEVERAGE STATION M-1202
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: Type 1

VOLT: 120V
PHASE: 1
WIRE: 2

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 60 A
MCB TRIP: 100 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POLE	A	B	C	POLE	OCF	WIRE SIZE	LOAD DESCRIPTION	#
1	ICED TEA BREWER	2#12+1#12G	20 A	1	360	360		1	20 A	2#12+1#12G	ICED TEA BREWER	2
3	COFFEE GRINDER	2#12+1#12G	20 A	1	1128	1128		1	20 A	2#12+1#12G	COFFEE GRINDER	4
5	COFFEE BREWER	2#8+1#10G	35 A	1	3048	3048		1	35 A	2#8+1#10G	COFFEE BREWER	6
7	COFFE DISPENSER	2#12+1#12G	20 A	1	180	180		1	20 A	2#12+1#12G	COFFEE DISPENSER	8
9	CTR TOP...	2#12+1#12G	20 A	1	144	144		1	20 A	2#12+1#12G	CTR TOP...	10
11	CTR TOP...	2#12+1#12G	20 A	1	144	144		1	20 A	2#12+1#12G	CTR TOP...	12
13	JUICE DISPENSER	2#12+1#12G	20 A	1	720	720		1	20 A	2#12+1#12G	JUICE DISPENSER	14
15	ICE & BEVERAGE DISP	2#12+1#12G	20 A	1	2309	2309		1	20 A	2#12+1#12G	ICE & BEVERAGE DISP	16
17	SPARE	--	20 A	1	0	0		1	20 A	--	SPARE	18
TOTAL PHASE LOAD			16,066 VA									
TOTAL CONNECTED LOAD												
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS						
Receptacle			16,066 VA	81.12%	13,033 VA							
						TOTAL CONN. LOAD...	16,066 VA					
						TOTAL EST. DEMAND...	13,033 VA					
						TOTAL CONN. AMPS:	134 A					
						TOTAL DEMAND AMPS:	109 A					

Notes:

PANEL NAME: LC-128N

LOCATION: BEVERAGE STATION M-1206A
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: NEMA-4X

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 100 A
MCB TRIP: 100 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	ICED TEA BREWER	2#12+1#12G	20 A	1	180	1154			2	20 A	2#12+1#12G	ICEMAKER	4
3	ICE BEV DISP	2#12+1#12G	20 A	1		336	1154		2	20 A	2#12+1#12G	ICED TEA BREWER	6
5	JUICE DISP	2#12+1#12G	20 A	1			720	360	1	20 A	2#12+1#12G	ICED TEA BREWER	6
7	COUNTERTOP...	2#12+1#12G	20 A	1	144	0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	14
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16
17	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	18
TOTAL PHASE LOAD			1,478 VA		1,490 VA		1,080 VA						
TOTAL CONNECTED LOAD			11 A										
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS							
Power			2,309 VA	100.00%	2,309 VA								
Receptacle			1,740 VA	100.00%	1,740 VA								
						TOTAL CONN. LOAD...	4,049 VA						
						TOTAL EST. DEMAND...	4,049 VA						
						TOTAL CONN. AMPS:	11 A						
						TOTAL DEMAND AMPS:	11 A						

Notes:

PANEL NAME: LC-128S

LOCATION: BEVERAGE STATION M-1206A
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: NEMA-4X

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 100 A
MCB TRIP: 100 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	COFFEE GRINDER	2#12+1#12G	20 A	1	1128	1155			2	20 A	2#12+1#12G	ICE MAKER	4
3	ICE BEV DISP	2#12+1#12G	20 A	1		336	1155		2	20 A	2#12+1#12G	ICED TEA BREW	6
5	JUICE DISP	2#12+1#12G	20 A	1			1128	1128	1	20 A	2#12+1#12G	FRIDGE 2	8
7	FRIDGE 1	2#12+1#12G	20 A	1	144	144			1	20 A	2#12+1#12G	FRIDGE 2	8
9	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	14
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16
17	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	18
TOTAL PHASE LOAD			2,440 VA		1,438 VA		2,256 VA						
TOTAL CONNECTED LOAD			17 A										
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS							
Power			2,309 VA	100.00%	2,309 VA								
Receptacle			4,008 VA	100.00%	4,008 VA								
						TOTAL CONN. LOAD...	6,017 VA						
						TOTAL EST. DEMAND...	6,017 VA						
						TOTAL CONN. AMPS:	17 A						
						TOTAL DEMAND AMPS:	17 A						

Notes:

PANEL NAME: LC-137

LOCATION: COLD LINE SERVERY M-1204
FED FROM: O1LKA
MOUNTING STYLE: Surface
NEMA RATING: Type 1

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING:
MCB OR MLO: MCB
BUS RATING: 60 A
MCB TRIP: 60 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	DROP-IN 4 WELL...	2#12+1#12G	20 A	1	1068	1068		1	20 A	2#12+1#12G	DROP-IN 4 WELL...	2	
3	DROP-IN 4 WELL...	2#12+1#12G	20 A	1		1068	900		1	20 A	2#12+1#12G	DROP-IN 2 WELL...	4
5	FOOD GUARD LTS	2#12+1#12G	20 A	1			96	0	1	20 A	--	SPARE	6
7	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	14
15	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	16
17	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	18
TOTAL PHASE LOAD			2,136 VA		1,968 VA		96 VA						
TOTAL CONNECTED LOAD			12 A										
LOAD CLASSIFICATION			CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS							
Power			96 VA	100.00%	96 VA								
Receptacle			4,104 VA	100.00%	4,104 VA								
						TOTAL CONN. LOAD...	4,200 VA						
						TOTAL EST. DEMAND...	4,200 VA						
						TOTAL CONN. AMPS:	12 A						
						TOTAL DEMAND AMPS:	12 A						

Notes:

PANEL NAME: EGL

LOCATION: ATS ROOM M-0202
FED FROM: T-E
MOUNTING STYLE: Surface
NEMA RATING: Type 1

VOLT: 120/208 Wye
PHASE: 3
WIRE: 4

A.I.C. RATING: 22,000
MCB OR MLO: MCB
BUS RATING: 100 A
MCB TRIP: 30 A

#	LOAD DESCRIPTION	WIRE SIZE	OCF	POL E	A	B	C	POL E	OCF	WIRE SIZE	LOAD DESCRIPTION	#	
1	LEVEL-0 - WEST BPS	2#10+1#10G	20 A	1	732	800			1	20 A	2#10+1#10G	LEVEL 1 - EAST BPS	2
3	SPARE	--	20 A	1		0	0		1	20 A	--	SPARE	4
5	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	6
7	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	8
9	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	10
11	SPARE	--	20 A	1			0	0	1	20 A	--	SPARE	12
13	SPARE	--	20 A	1	0	0			1	20 A	--	SPARE	14
15	SPARE	--											

OPTIONAL STAND-BY PANEL SCHEDULES

SWB: DP-MGH														
LOCATION: ELECTRICAL SERVICE ROOM M-0201 VOLT: 120/208 Wye A.I.C. RATING: 42,000														
FED FROM: SW-M PHASE: 3 M/OMCB: BOLTED PRESSURE SERVICE SWITCH														
MOUNTING: SW-M WIRE: 4 BUS RATING: 3,000 A														
NEMA RATING: Type 1														
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL E	A	B	C	POL E	OC	WIRE SIZE	LOAD DESCRIPTION	#		
1	F-LDP	3	600 A		392,408 VA						SEE SINGLE LINE			
2	T-MGLA	3	50 A		18,116 VA						2 SET OF (3)350KCMIL + 1#1G IN (2) 3"			
3	M3HA	3	200 A		63,897 VA						2 SETS OF (4)350KCMIL + 1#1G IN (2) 3"			
4	M3HA	3	125 A		58,420 VA						4#1 + 1#6G IN 1 1/2" C			
5	M2HA	3	125 A		46,561 VA						4#1 + 1#6G IN 1 1/2" C			
6	M1HA	3	60 A		29,236 VA						4#1 + 1#10G IN 1 1/4" C			
7	MGHE	3	300 A		191,264 VA						(3)350KCMIL + 1#4G IN 2 1/2" C			
8	M3HD	3	400 A		411,575 VA						(4)800KCMIL + 1#3G IN 4" C			
9	MAQ-GEN	3	20 A		17,956 VA						SEE SINGLE LINE DIAGRAM			
10	PHH	3	1,800 A		310,318 VA						(4)800KCMIL + 1#3G IN 4" C			
11	GLH	3	400 A		216,868 VA						SEE SINGLE LINE DIAGRAM			
12	M1HB	3	100 A		28,149 VA						SEE SINGLE LINE DIAGRAM			
13	M2HB	3	125 A		57,224 VA						SEE SINGLE LINE DIAGRAM			
14	M4HB	3	125 A		55,462 VA						SEE SINGLE LINE DIAGRAM			
15	M3HB	3	125 A		44,150 VA						SEE SINGLE LINE DIAGRAM			
16	M3HA	3	100 A		40,903 VA						4#1 + 1#6G IN 1 1/2" C			
17	M3HB	3	100 A		34,758 VA						SEE SINGLE LINE DIAGRAM			
18	M3HC	3	100 A		84,906 VA						SEE SINGLE LINE DIAGRAM			
19	T-MGLA	3	50 A		18,300 VA						SEE SINGLE LINE DIAGRAM			
20	PREPARED SPACE	1	--		--						--			
21	PREPARED SPACE	1	--		--						--			
22	PREPARED SPACE	1	--		--						--			
23	PREPARED SPACE	1	--		--						--			
24	PREPARED SPACE	1	--		--						--			
25	PREPARED SPACE	1	--		--						--			
26	PREPARED SPACE	1	--		--						--			
27	PREPARED SPACE	1	--		--						--			
28	PREPARED SPACE	1	--		--						--			
29	PREPARED SPACE	1	--		--						--			
30	PREPARED SPACE	1	--		--						--			
TOTAL PHASE LOAD					5,596 VA	6,100 VA	6,420 VA							
TOTAL CONNECTED LOAD					50 A									
LOAD CLASSIFICATION														
CONNECTED...					CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS						
Lighting					36 VA	100.00%	36 VA	TOTAL CONN. LOAD... 18,116 VA						
Other					18,080 VA	77.65%	14,040 VA	TOTAL EST. DEMAND... 14,070 VA						
Power					TOTAL CONN. AMP... 50 A					TOTAL DEMAND AMPS: 39 A				
Receptacle					TOTAL CONN. AMP... 50 A					TOTAL DEMAND AMPS: 39 A				

SWB: DP-OGHA														
LOCATION: ELECTRICAL SERVICE ROOM M-0201 VOLT: 120/208 Wye A.I.C. RATING: 42,000														
FED FROM: A-OGH PHASE: 3 M/OMCB: BOLTED PRESSURE SERVICE SWITCH														
MOUNTING: FLOOR MOUNTED WIRE: 4 BUS RATING: 4,000 A														
NEMA RATING: NEMA-1														
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL E	A	B	C	POL E	OC	WIRE SIZE	LOAD DESCRIPTION	#		
1	OGHA	3	100 A		122,597 VA						4#1 + 1#6G IN 1 1/2" C			
2	ELEVATOR ROOM M-0117	3	80 A		28,221 VA						SEE SINGLE LINE DIAGRAM			
3	OGHA	3	30 A		121,534 VA						SEE SINGLE LINE DIAGRAM			
4	F-CHP (FTU BLDG)	3	100 A		65,095 VA						4#1 + 1#6G IN 1 1/2" C			
5	O2HA	3	30 A		99,713 VA						SEE SINGLE LINE DIAGRAM			
6	WVHRM-1	3	600 A		403,000 VA						(2) SETS OF 3#350KCMIL + 1#1G IN (2) 3"			
7	O3HA	3	175 A		154,893 VA						SEE SINGLE LINE DIAGRAM			
8	WVHRM-2	3	600 A		403,000 VA						(2) SETS OF 3#350KCMIL + 1#1G IN (2) 3"			
9	O3HA	3	30 A		95,939 VA						SEE SINGLE LINE DIAGRAM			
10	DP-OGHB	3	1,200 A		961,507 VA						3 SETS OF (4)600KCMIL + 1#3G IN (3) 4"			
11	PREPARED SPACE	1	--		--						--			
12	PREPARED SPACE	1	--		--						--			
13	PREPARED SPACE	1	--		--						--			
14	PREPARED SPACE	1	--		--						--			
15	PREPARED SPACE	1	--		--						--			
16	PREPARED SPACE	1	--		--						--			
17	PREPARED SPACE	1	--		--						--			
18	PREPARED SPACE	1	--		--						--			
19	PREPARED SPACE	1	--		--						--			
20	PREPARED SPACE	1	--		--						--			
21	PREPARED SPACE	1	--		--						--			
22	PREPARED SPACE	1	--		--						--			
23	PREPARED SPACE	1	--		--						--			
24	PREPARED SPACE	1	--		--						--			
25	PREPARED SPACE	1	--		--						--			
26	PREPARED SPACE	1	--		--						--			
27	PREPARED SPACE	1	--		--						--			
28	PREPARED SPACE	1	--		--						--			
29	PREPARED SPACE	1	--		--						--			
30	PREPARED SPACE	1	--		--						--			
TOTAL PHASE LOAD					1,200 VA	1,200 VA	0 VA							
TOTAL CONNECTED LOAD					2,455.218 VA									
TOTAL CONNECTED AMPS					2,953 A									
LOAD CLASSIFICATION														
CONNECTED...					CONN. LOAD	DEMAND FACTOR	ESTIMATED...	TOTALS						
Equipment					4,000 VA	100.00%	4,000 VA	TOTAL CONN. LOAD... 2,455.218 VA						
HVAC					62,820 VA	100.00%	62,820 VA	TOTAL EST. DEMAND... 2,028.025 VA						
Lighting					142,188 VA	100.00%	142,188 VA	TOTAL CONN. AMP... 2,953 A						
Motor					2,000 VA	106.25%	2,125 VA	TOTAL DEMAND... 2,439 A						
Other					22,096 VA	100.00%	22,096 VA	TOTAL CONN. AMP... 2,439 A						
Power					1,357,510 VA	100.00%	1,357,510 VA	TOTAL DEMAND... 2,439 A						
Receptacle					864,664 VA	50.58%	437,332 VA	TOTAL DEMAND... 2,439 A						

PANEL NAME: E2L														
LOCATION: EM. ELEC. CLOSET M-2106B VOLT: 120/208 Wye A.I.C. RATING: 10,000														
FED FROM: E1L PHASE: 3 MCB OR MLO: MCB														
MOUNTING STYLE: Surface WIRE: 4 BUS RATING: 100 A														
NEMA RATING: Type 1 MCB TRIP: 100 A														
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL E	A	B	C	POL E	OC	WIRE SIZE	LOAD DESCRIPTION	#		
1	LEVEL 2 - WEST BPS	2#10+1#10G	20 A	2	25	25				2	20 A	2#10+1#10G	2	
2	SPARE	--	20 A	1						1	20 A	--	4	
3	SPARE	--	20 A	1						1	20 A	--	6	
4	SPARE	--	20 A	1	0	0				1	20 A	--	8	
5	SPARE	--	20 A	1						1	20 A	--	10	
6	SPARE	--	20 A	1						1	20 A	--	12	
7	SPARE	--	20 A	1						1	20 A	--	14	
8	SPARE	--	20 A	1						1	20 A	--	16	
9	SPARE	--	20 A	1						1	20 A	--	18	
10	SPARE	--	20 A	1						1	20 A	--	20	
11	SPARE	--	20 A	1						1	20 A	--	22	
12	SPARE	--	20 A	1						1	20 A	--	24	
13	SPARE	--	20 A	1	0	0				1	20 A	--		
14	SPARE	--	20 A	1						1	20 A	--		
15	SPARE	--	20 A	1						1	20 A	--		
16	SPARE	--	20 A	1						1	20 A	--		
17	SPARE	--	20 A	1						1	20 A	--		
18	SPARE	--	20 A	1						1	20 A	--		
19	SPARE	--	20 A	1	0	100				3	20 A	--		
20	SPARE	--	20 A	1						1	20 A	--		
21	SPARE	--	20 A	1						1	20 A	--		
22	SPARE	--	20 A	1						1	20 A	--		
23	SPARE	--	20 A	1						1	20 A	--		
TOTAL PHASE LOAD					150 VA	150 VA	0 VA							
TOTAL CONNECTED LOAD					300 VA									
LOAD CLASSIFICATION														
CONNECTED...					CONN. LOAD	DEMAND FACTOR	EST. DEMAND	TOTALS						
Power					300 VA	100.00%	300 VA	TOTAL CONN. LOAD... 300 VA						
TOTAL EST. DEMAND...					TOTAL CONN. AMP... 300 VA					TOTAL DEMAND AMPS: 1 A				

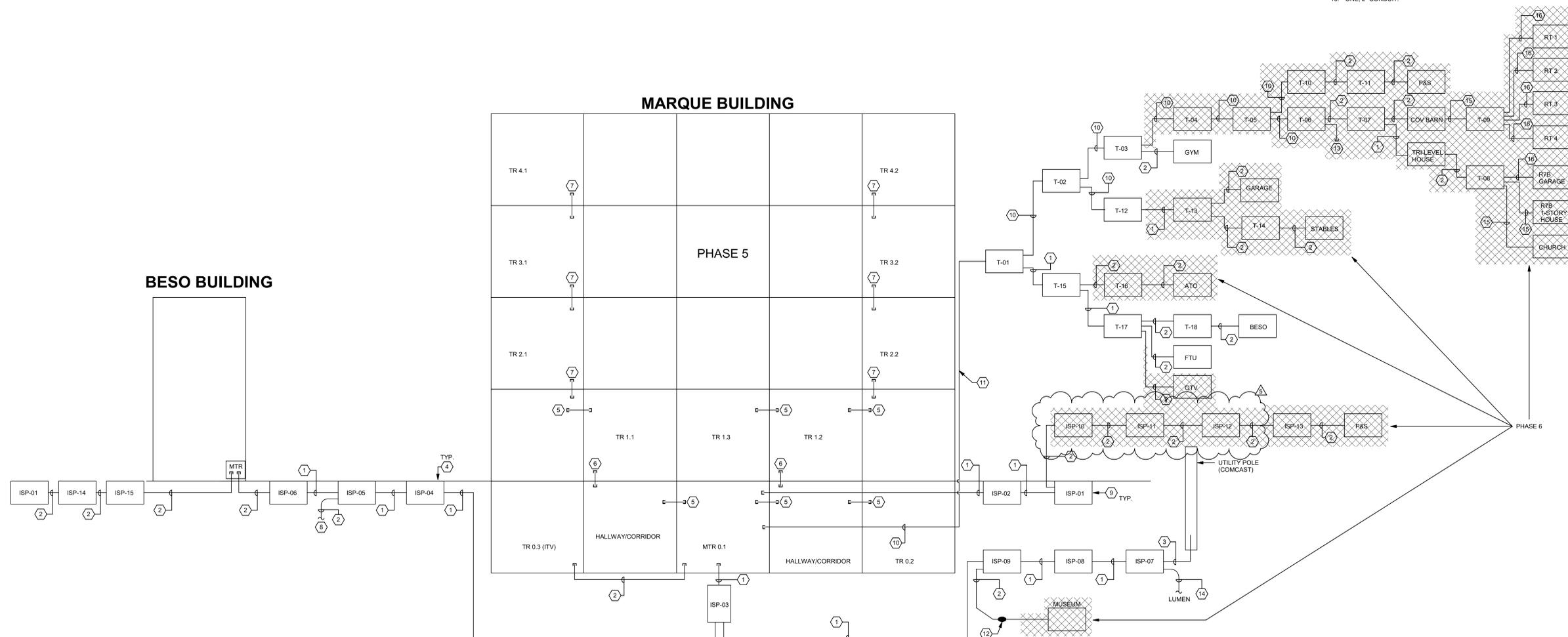
PANEL NAME: E3L													
LOCATION: EM. ELEC. CLOSET M-3106B VOLT: 120/208 Wye A.I.C. RATING: 10,000													
FED FROM: E2L PHASE: 3 MCB OR MLO: MCB													
MOUNTING STYLE: Surface WIRE: 4 BUS RATING: 100 A													
NEMA RATING: Type 1 MCB TRIP: 100 A													
#	LOAD DESCRIPTION	WIRE SIZE	OC	POL E	A	B	C	POL E	OC	WIRE SIZE	LOAD DESCRIPTION	#	
1	LEVEL 3 - WEST BPS	2#10+1#10G	20 A	2	25	25				2	20 A	2#10+1#10G	2
2	SPARE	--	20 A	1						1	20 A	--	4
3	SPARE	--	20 A	1						1	20 A	--	6
4	SPARE	--	20 A	1	0	0				1	20 A	--	8
5	SPARE	--	20 A	1						1	20 A	--	10
6	SPARE	--	20 A	1						1	20 A	--	12
7	SPARE	--	20 A	1						1	20 A	--	14
8	SPARE	--	20 A	1						1	20 A	--	16
9	SPARE	--	20 A	1						1	20 A	--	18
10	SPARE	--	20 A	1						1	20 A	--	20
11	SPARE	--	20 A	1						1	20 A	--	22
12	SPARE	--	20 A	1						1	20 A	--	24
13	SPARE	--	20 A	1	0	0				1	20 A	--	
14	SPARE	--	20 A	1						1			

GENERAL SHEET NOTES

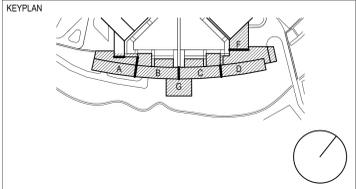
- SEE OVERALL FLOOR PLANS FOR COMPLETE BACKBONE CABLING PATHWAY.
- SEE SHEET MAQ-TC-403 FOR ADDITIONAL CABLING REQUIREMENTS.
- ISP VAULT 01, IS SHOWN TWICE ON THE DIAGRAM FOR CLARITY. COORDINATE WITH FIELD CONDITIONS AND ISP. SEE SITE PLAN.
- ALL VAULTS THAT SERVE OTHER PACKAGES MUST HAVE THE CONDUITS STUBBED OUT FROM THE VAULT SO THERE IS NO REWORK CONNECTING TO THE VAULTS IN FUTURE PHASES. CONDUITS THAT ARE STUBBED OUT OF THE VAULTS MUST BE CAPPED AND SEALED FOR FUTURE PHASES.
- ALL VAULTS ARE IN GROUND. ALL VAULTS AND CONDUITS ARE SHOWN FOR CLARITY PURPOSES.

SHEET KEYNOTES

- FOUR, 4" CONDUITS.
- TWO, 4" CONDUITS.
- ONE, 4" CONDUIT STUB 36" ABOVE GROUND AND ANCHOR TO THE UTILITY POLE.
- 4"W x 6"L x 4"D ISP VAULT.
- IN BUILDING CABLING PATHWAY (CABLE TRAYS, EZ-PATH SERIES 44+S, CONDUITS, ETC).
- THREE, 4" CONDUIT STUB INTO TR.
- FOUR, EZ-PATH FIRE RATED PATHWAY SERIES 44+, INSTALLED ON FLOOR.
- CONTRACTOR TO PROVIDE CONDUITS TO WITHIN 5' OF PROPERTY LINE AND COORDINATE THE CONNECTIONS TO ISP CONDUITS.
- 4"W x 6"L x 4"D TELECOMMUNICATIONS VAULT FOR ISP DISTRIBUTION.
- EIGHT, 4" CONDUITS.
- CONTINUATION OF OWNER OSP BACKBONE TO THE REST OF THE CAMPUS. SEE TELECOM SITE PLAN FOR APPROXIMATE LOCATIONS OF VAULTS AND CONDUIT DUCT BANK INFORMATION.
- COORDINATE CONNECTION POINT TO EXISTING CONDUIT INFRASTRUCTURE WITH OWNER, MUSEUM, AND COMCAST SO SERVICE IS NOT INTERRUPTED. SEE SITE PLAN.
- STUB, CAP AND SEAL CONDUITS FOR PROPOSED CELL TOWER. COORDINATE FINAL LOCATION WITH OWNER AND CELL TOWER CONSTRUCTION.
- ONE, 4" CONDUIT STUBBED TO 5' OF PROPERTY LINE. CONTRACTOR TO COORDINATE WITH LUMEN FOR FINAL CONNECTION.
- ONE, 4" CONDUIT.
- ONE, 2" CONDUIT.



- 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, 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
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- Patricia Hord Graphik Design**
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- Lee and Associates, Inc.**
6381 I Street NW, Washington, DC 20001
- LIGHTING
- MCLA**
1000 Potomac 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



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
6	7 JUL 23	ADDENDUM 31			
3	16 JUN 2023	ISSUED FOR BID			

RECORD REVISIONS

SIGNATURE: *AF* DATE: 7/7/2023

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

SINGLE LINE DIAGRAM - TELECOMMUNICATIONS

SHEET No. MAQ-TC-401

DRAWN BY: AD	CHECKED BY: MT	DATE:	SCALE: AS NOTED
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1 TELECOMMUNICATIONS BACKBONE PATHWAY DIAGRAM
NO SCALE

INTERFACE ENGINEERING

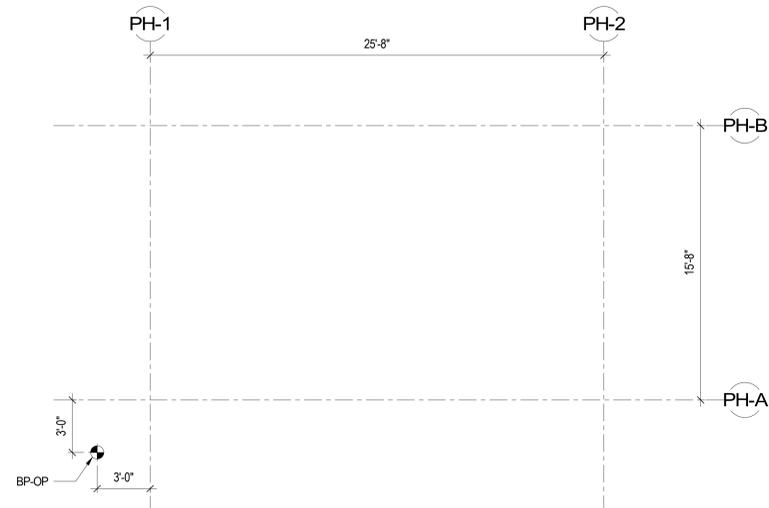
PROJECT: 2021-0159
CONTACT: Robert Gannon
2000 M Street NW, Suite 270
Washington, DC 20036
TEL: 202.370.9555
www.interfaceengineering.com

VERIFY SCALE

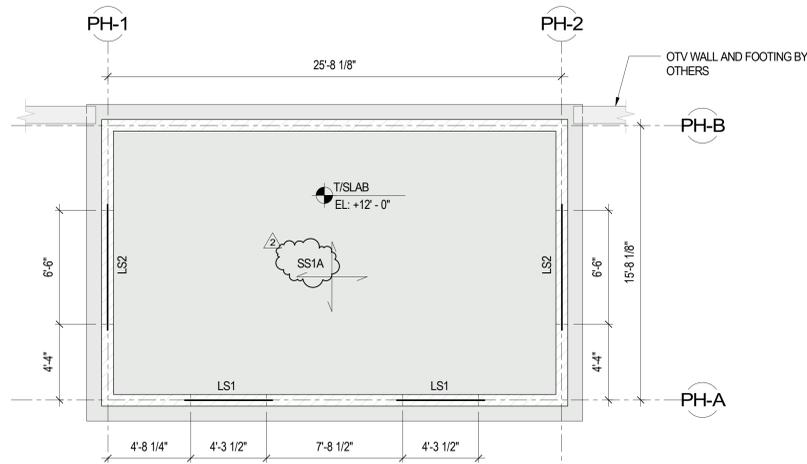
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CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

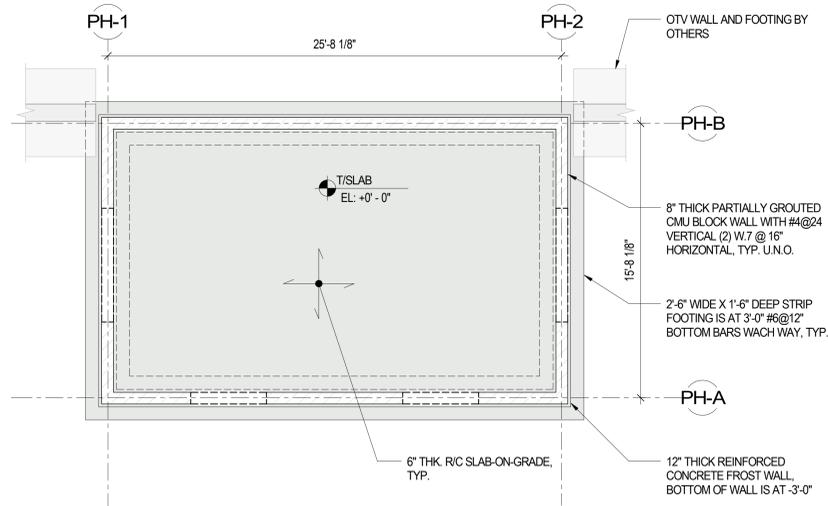


3 PUMP HOUSE GRID SETOUT PLAN
1/4" = 1'-0"



NOTE:
1. ROOF IS DESIGNED FOR 20PSF LIVE LOAD.
2. CMU WALLS ARE CENTERED ON GRIDLINES, TYP. U.N.O.

2 PUMP HOUSE - T.O. ROOF
1/4" = 1'-0"

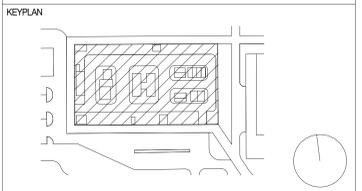


1 PUMP HOUSE - T/SLAB LEVEL 1
1/4" = 1'-0"

SLAB-ON-GRADE REINFORCEMENT SCHEDULE				f _c = 4000 psi f _y = 60 ksi
BUILDING	T(in)	REINFORCEMENT		REMARKS
		TOP	BOTTOM	
OTV	6	12X12 - W7XW7		

- NOTES:
- BUILDING ELEVATIONS ARE REFERENCED TO BUILDING REFERENCE DATUM, EL. +0' = NAVD 88 DATUM, SEE GEN-G-100
 - DATA FOR MASONRY: fm = 1900 PSI
 - 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 | C₁ = 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.
 - SEE GEN-S-003 FOR FOUNDATION AND EXCAVATION NOTES
 - SEE GEN-S-004 AND GEN-S-005 FOR CONCRETE AND STRUCTURAL STEEL AND METAL DECK NOTES
 - WATERPROOFING MEMBRANE/ ADMIXTURE AND PLANT MADE WEEP HOLES SHALL BE PROVIDED AT ALL HOLLOW CORE LOCATIONS
 - SEE ARCHITECTURAL DRAWINGS FOR DOOR AND WINDOW OPENINGS DIMENSION
 - SEE GEN-S-301 AND GEN-S-302 FOR FOOTING DETAILS. SEE OTV-00V-S-301 FOR FOOTING SCHEDULE
 - SEE GEN-S-321 AND GEN-S-322 FOR SLAB ON GRADE DETAILS. SEE OTV-S-301 FOR SLAB-ON-GRADE SCHEDULE
 - SEE GEN-S-420 FOR RC SLAB DETAILS AND SCHEDULE
 - SEE GEN-S-421 FOR RC BEAM DETAILS AND SCHEDULE
 - SEE GEN-S-501 AND GEN-S-502 FOR TYPICAL STRUCTURAL STEEL DETAILS
 - SEE GEN-S-521 FOR METAL DECK SLAB DETAILS AND SCHEDULE
 - SEE GEN-S-601 TO 603 FOR MASONRY DETAILS
 - SEE DETAIL 01/06-OTV-S-101 FOR DETAIL AT MASONRY PARAPET WALL

- TACTICAL TRAINING DESIGN
- Tactical Design North**
231 E. Buffalo St #502, Milwaukee, WI 53202
- LOCAL ARCHITECT
- Jacobs Wyper Architects**
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- 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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- Interface Engineering, Inc.**
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1001 Ave of the Americas, 4th Floor, New York, NY 10018
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- CCI**
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- CIVIL ENGINEER
- Langan**
1818 Market St #3300, Philadelphia, PA 19103
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- 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



NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
2	07 JUL 2023	ADDENDUM 31			
1	16 JUN 2023	ADDENDUM 27			

RECORD REVISIONS

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

PA State Police Academy - New Construction of Three Core Buildings and BES0

PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

VERIFY SCALE

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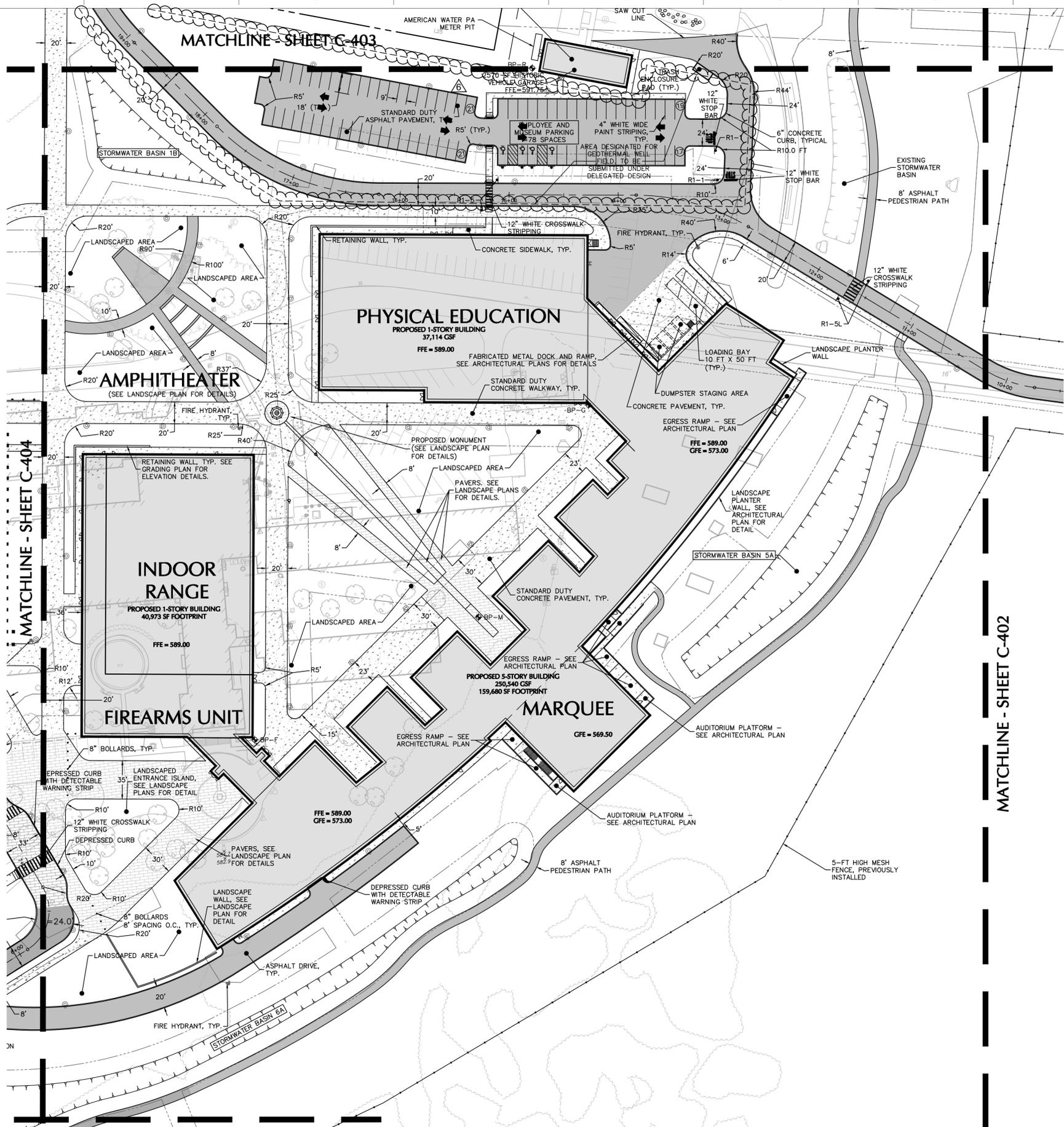
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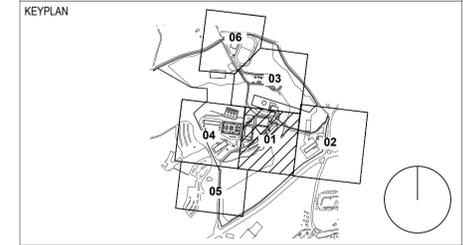
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FRAMING PLANS - LEVEL 1 AND 2



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
STRUCTURAL ENGINEER	E. P. FP, FA ENGINEER
Skidmore, Owings & Merrill LLP 250 Greenwich St, New York, NY 10007	A & J Consulting Engineering Services 164 Brighton Rd, Clifton, NJ 07012
MECHANICAL/AVIT ENGINEER	ACOUSTICAL ENGINEER
Interface Engineering, Inc. 2000 M Street NW, Washington, DC 20036	Cerami 1001 Ave of the Americas, New York, NY 10018
CODE CONSULTING	CIVIL ENGINEER
CCI 215 W 40th St, 10th Floor, New York, NY 10018	Langan 1818 Market St #3300, Philadelphia, PA 19103
VERTICAL TRANSPORT	SIGNAGE CONSULTANT
Michael Blades & Associates Ltd. 5409 Rapidan Ct, Lothian, MD 20711	Patricia Hord Graphik Design 119 S. St. Asaph St, Alexandria, VA 22314
LANDSCAPE	LIGHTING
Lee and Associates, Inc. 6381 I Street NW, Washington, DC 20001	MCLA 1000 Potomac St NW, Washington, DC 20007
FOOD SERVICE	COST ESTIMATING
Hopkins Foodservice Specialists, Inc. 7906 MacArthur Blvd, Cabin John, MD 20818	Aqua Design International 7536 N. La Cholla Blvd, Tucson, AZ 85741

NOTE



4	29 JUL 2022	NPDES COMMENTS	
3	02 JUN 2022	TOWNSHIP COMMENTS	
2	06 MAY 2022	TOWNSHIP COMMENTS	07 JULY 2023 BID ADDENDUM 31
1	18 FEB 2022	ISSUED TO L&I	19 MAY 2023 ISSUED FOR BID

RECORD REVISIONS

2023-07-07
DATE
SIGNATURE: CHRISTOPHER HAGER, PE
PROFESSIONAL ENGINEER
PA LIC. NO. 63172

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, BES0 & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

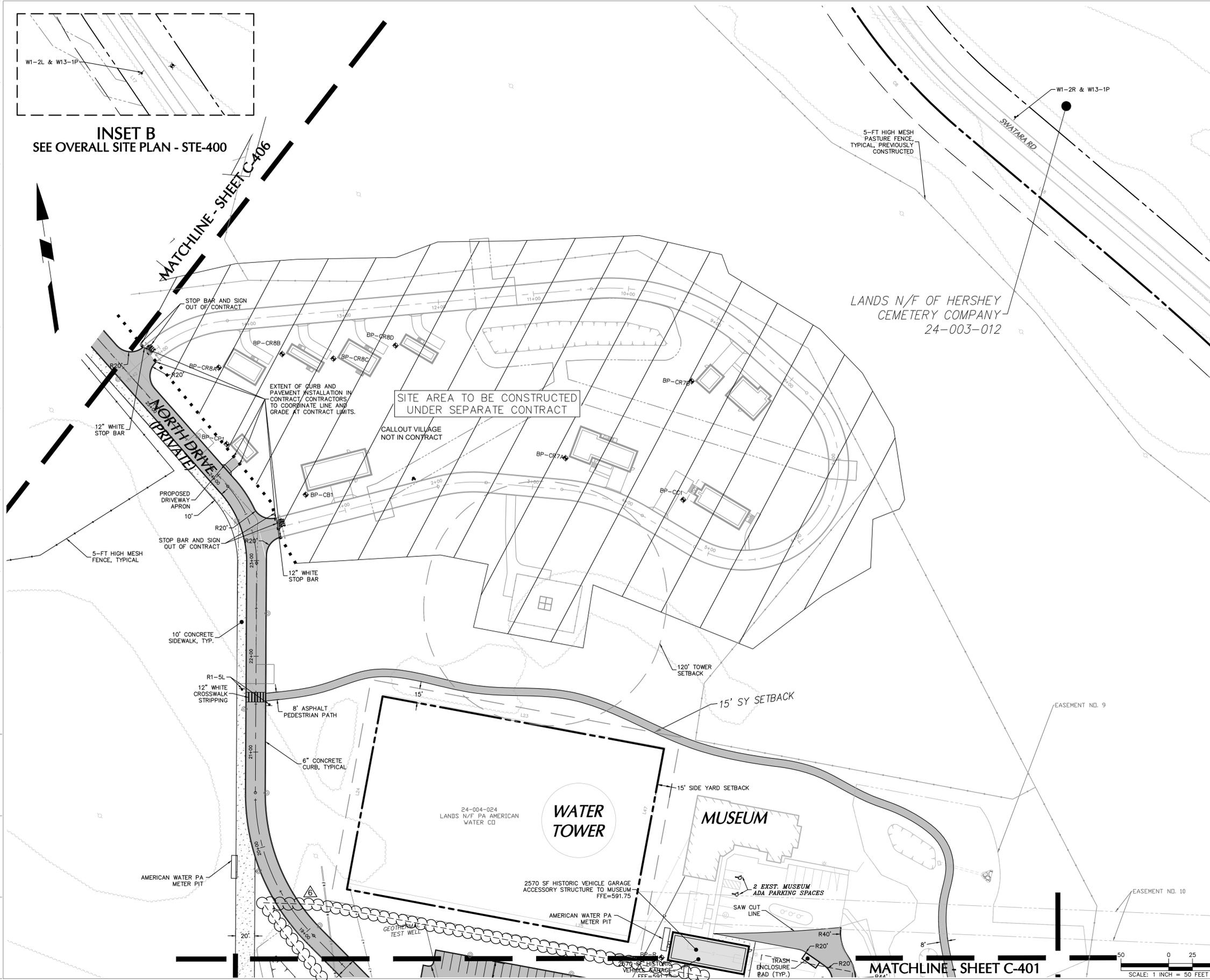
VERIFY SCALE
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CONTRACTOR SHALL VERIFY
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SITE PLAN - 1

SHEET No. **STE-C-401**

DRAWN BY TJM/BXP/KSB	CHECKED BY KLF	DATE MAY 2023	SCALE AS NOTED
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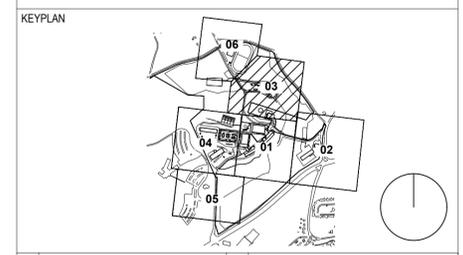
INSET B
SEE OVERALL SITE PLAN - STE-400

LANDS N/F OF HERSHEY
CEMETERY COMPANY
24-003-012

SITE AREA TO BE CONSTRUCTED
UNDER SEPARATE CONTRACT

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
STRUCTURAL ENGINEER	E, P, FP, FA ENGINEER
Skidmore, Owings & Merrill LLP 250 Greenwich St, New York, NY 10007	A & J Consulting Engineering Services 164 Brighton Rd, Clifton, NJ 07012
MECHANICAL, AVIT ENGINEER	ACOUSTICAL ENGINEER
Interface Engineering, Inc. 2000 M Street NW, Washington, DC 20036	Cerami 1001 Ave of the Americas, New York, NY 10018
CODE CONSULTING	CIVIL ENGINEER
CCI 215 W 40th St, 10th Floor, New York, NY 10018	Langan 1818 Market St #3300, Philadelphia, PA 19103
VERTICAL TRANSPORT	SIGNAGE CONSULTANT
Michael Blades & Associates Ltd. 5409 Rapidan Ct, Lothian, MD 20711	Patricia Hord Graphik Design 119 S. St. Asaph St, Alexandria, VA 22314
LANDSCAPE	LIGHTING
Lee and Associates, Inc. 638 I Street NW, Washington, DC 20001	MCLA 1000 Potomac St NW, Washington, DC 20007
FOOD SERVICE	COST ESTIMATING
Hopkins Foodservice Specialists, Inc. 7906 MacArthur Blvd, Cabin John, MD 20818	Aqua Design International 7536 N. La Cholla Blvd, Tucson, AZ 85741

NOTE



4	29 JUL 2022	NPDES COMMENTS	
3	02 JUN 2022	TOWNSHIP COMMENTS	
2	06 MAY 2022	TOWNSHIP COMMENTS	6 07 JULY 2023 BID ADDENDUM 31
1	18 FEB 2022	ISSUED TO L&I	5 19 MAY 2023 ISSUED FOR BID

RECORD REVISIONS

2023-07-07
SIGNATURE DATE
CHRISTOPHER HAGER, PE
PROFESSIONAL ENGINEER
PA LIC. NO. 63172

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

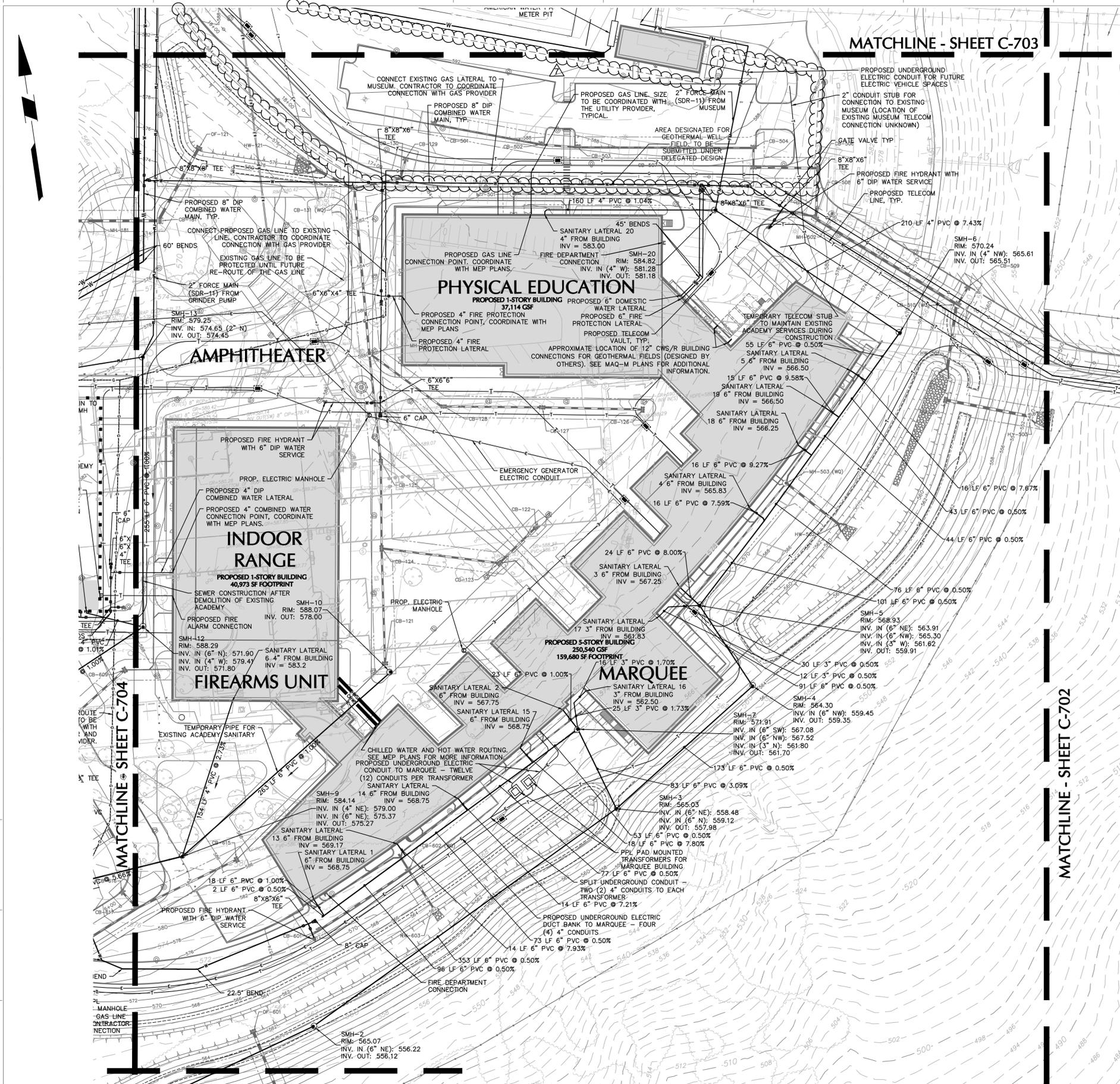
VERIFY SCALE

BAR IS ONE (1) INCH LONG
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CONTRACTOR SHALL FIELD VERIFY
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OF CONSTRUCTION APPROVAL.

SHEET No.	STE-C-403		
DRAWN BY	CHECKED BY	DATE	SCALE
TJM/BXP/KSB	KLF	MAY 2023	AS NOTED

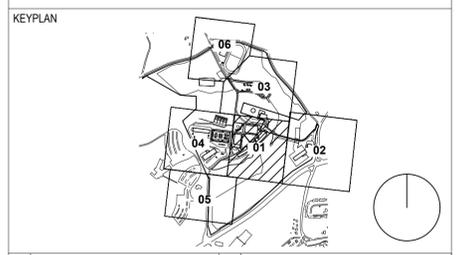


MATCHLINE - SHEET C-703

MATCHLINE - SHEET C-702

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	E. P. FA ENGINEER A & J Consulting Engineering Services 164 Brighton Rd, Clifton, NJ 07012
MECHANICAL AVIAT ENGINEER Interface Engineering, Inc. 2000 M Street NW, Washington, DC 20036	ACOUSTICAL ENGINEER Ceram 1001 Ave of the Americas, 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 Potomac St NW, Washington, DC 20007
FOOD SERVICE Hopkins Foodservice Specialists, Inc. 7906 MacArthur Blvd, Cabin John, MD 20818	COST ESTIMATING Aqua Design International 7536 N. La Cholla Blvd, Tucson, AZ 85741

NOTE



4	29 JUL 2022	NPDES COMMENTS	
3	02 JUN 2022	TOWNSHIP COMMENTS	7 07 JULY 2023 BID ADDENDUM 31
2	06 MAY 2022	TOWNSHIP COMMENTS	6 30 JUNE 2023 BID ADDENDUM 29
1	18 FEB 2022	ISSUED TO L&I	5 19 MAY 2023 ISSUED FOR BID

RECORD REVISIONS

2023-07-07
SIGNATURE DATE
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PROFESSIONAL ENGINEER
PA LIC. NO. 63172

ARCHITECT
SOM
Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

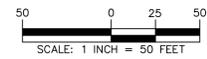
D.G.S. PROJECT No. C-0211-0005 PHASE 5

Pennsylvania State Police Academy
Core Buildings, BESO & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

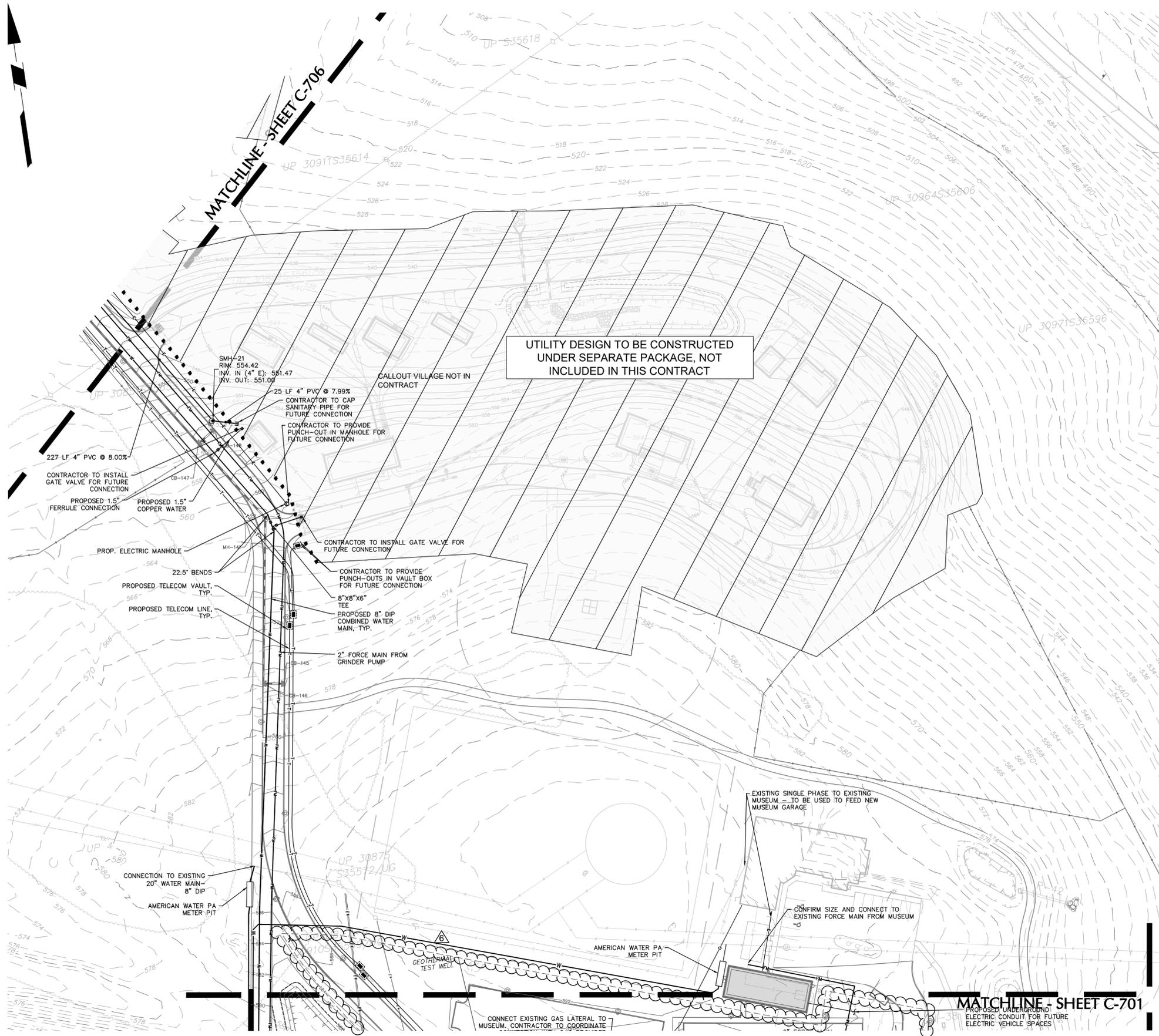
VERIFY SCALE

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.



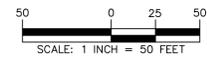
SHEET No.	STE-C-701		
DRAWN BY	CHECKED BY	DATE	SCALE
TJM/BXP/KSB	KLF	MAY 2023	AS NOTED



MATCHLINE - SHEET C-706

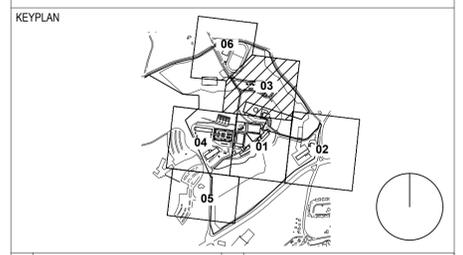
UTILITY DESIGN TO BE CONSTRUCTED UNDER SEPARATE PACKAGE, NOT INCLUDED IN THIS CONTRACT

MATCHLINE - SHEET C-701



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	E. P. P. FA ENGINEER A & J Consulting Engineering Services 164 Brighton Rd, Clifton, NJ 07012
MECHANICAL, AVIT ENGINEER Interface Engineering, Inc. 2000 M Street NW, Washington, DC 20036	ACOUSTICAL ENGINEER Ceram 1001 Ave of the Americas, 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 Potomac St NW, Washington, DC 20007
FOOD SERVICE Hopkins Foodservice Specialists, Inc. 7906 MacArthur Blvd, Cabin John, MD 20818	COST ESTIMATING Aqua Design International 7536 N. La Cholla Blvd, Tucson, AZ 85741

NOTE



4	29 JUL 2022	NPDES COMMENTS	
3	02 JUN 2022	TOWNSHIP COMMENTS	
2	06 MAY 2022	TOWNSHIP COMMENTS	6 07 JULY 2023 BID ADDENDUM 31
1	18 FEB 2022	ISSUED TO L&I	5 19 MAY 2023 ISSUED FOR BID

RECORD REVISIONS

2023-07-07
DATE
SIGNATURE
CHRISTOPHER HAGER, PE
PROFESSIONAL ENGINEER
PA LIC. NO: 63172

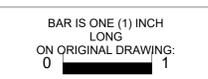
ARCHITECT
SOM
Skidmore, Owings & Merrill LLP
250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
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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

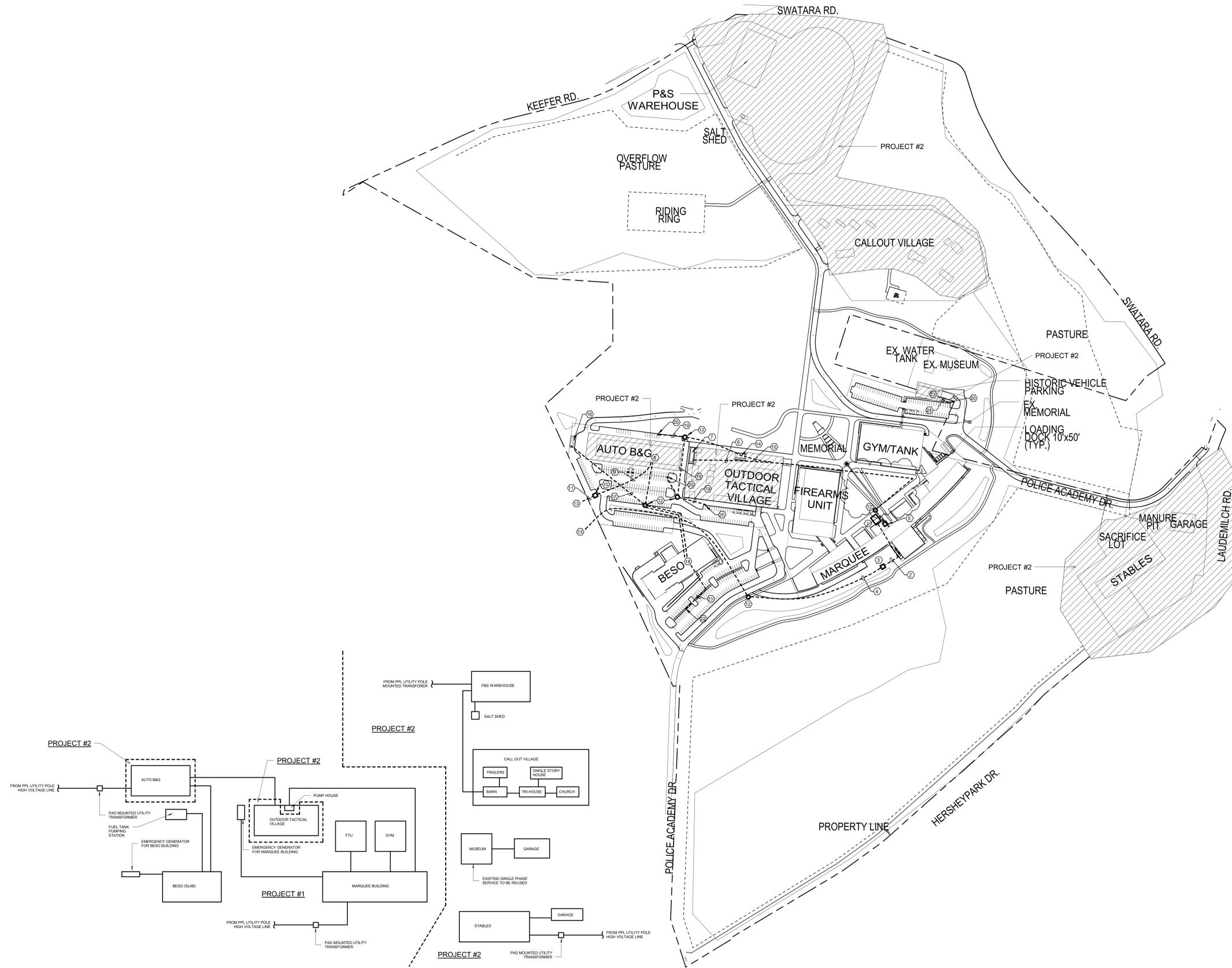
VERIFY SCALE



CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

SHEET No. **STE-C-703**

DRAWN BY TJM/BXP/KSB	CHECKED BY KLF	DATE MAY 2023	SCALE AS NOTED
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2 ELECTRICAL SERVICE BLOCK DIAGRAM
STE-E-100 SCALE: N.T.S.

1 ELECTRICAL SITE AND SERVICE PLAN
STE-E-100 SCALE: 1" = 160'-0"

- GENERAL NOTES**
- REFER TO GEN-E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
 - REFER TO GEN-E-701 FOR DETAILS.
 - CONDUIT ROUTING AND TRANSFORMER PAD AND UTILITY POLE LOCATIONS ON SITE ARE FOR REFERENCE ONLY. REFER TO SITE/CIVIL PLANS FOR EXACT LOCATION AND ROUTING.
- SHEET NOTES**
- MAIN SERVICE SWITCHBOARD IN MAIN ELECTRICAL ROOM
 - INCOMING 3 PHASE, 4 WIRE, 277/480V, 5000AMP UNDERGROUND SERVICE FEEDERS FROM UTILITY FOR MARQUEE BUILDING. THE CABLE ROUTING MAY CHANGE AS PER THE FINAL DECISION ON MAIN SERVICE FROM PPL. CONTRACTOR SHALL CONSIDER A SECOND SERVICE TO MARQUEE IF PPL DICTATES.
 - UTILITY TRANSFORMER PAD
 - INCOMING ELECTRIC SERVICE FEEDERS FROM UTILITY - (2) 4" CONDUITS
 - ATS ROOM
 - UNDERGROUND EMERGENCY ELECTRIC SERVICE FEEDERS FROM EMERGENCY GENERATOR
 - 3.25MW 480/277V, 3 PHASE EMERGENCY GENERATOR
 - CAP AND PROTECT FOR FUTURE CONNECTION IN PROJECT #2
 - 4 SETS OF 4" CONDUIT INCOMING 3 PHASE, 4 WIRE, 277/480V, 1800AMP UNDERGROUND SERVICE FEEDERS FROM UTILITY FOR AUTOMOTIVE B&G BUILDING
 - UTILITY TRANSFORMER PAD
 - INCOMING ELECTRIC SERVICE FEEDERS FROM UTILITY - (2) 4" CONDUITS
 - ELECTRIC MANHOLE. SEE DETAIL 4 ON SHEET GEN-E-704.
 - EXISTING UTILITY ELECTRIC TRANSMISSION POLES
 - PUMP HOUSE
 - FEEDERS FROM MARQUEE ELECTRIC ROOM - (3) 4" CONDUIT, (3) 1/0 AWG MI CABLE FOR FIRE PUMP.
 - FUEL PUMPING STATION, REFER TO MAQ-E-405
 - FEEDERS FROM PUMP HOUSE ELECTRIC ROOM - (1) 2" CONDUIT
 - BESO ELECTRICAL CLOSET, REFER TO BSO-E-100 FOR MORE INFORMATION
 - 1-1/2" CONDUIT FROM PUMP HOUSE TO EV CHARGING STATION
 - DUAL BOLLARD EV CHARGING STATION
 - (8) 1-1/2" CONDUITS FROM BESO TO EV CHARGING STATIONS
 - (8) DUAL BOLLARD EV CHARGING STATIONS
 - GARAGE ELECTRICAL CLOSET. REFER TO GRG-E-100 FOR MORE INFORMATION
 - 1-1/2" CONDUIT FROM GARAGE TO EV CHARGING STATION

GENERAL NOTES

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, AVIT ENGINEER

Interface Engineering, Inc.
2000 M Street NW, Suite 270, Washington, DC 20036

ACCUSTICAL 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 Potomac 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	07 JUL 2023	ADDENDUM 31			
1	19 MAY 2023	ISSUED FOR BID			
RECORD REVISIONS					

Jitendra K. Agarwal
 SIGNATURE DATE 2023-06-16

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

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SHEET No. **STE-E-100**

DRAWN BY	CHECKED BY	DATE	SCALE
AA	MK	APR 2022	AS NOTED