

DATE: June 9, 2023

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

ADDENDUM NO. 25

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:

- Pre-bid conference is Friday, June 16 at 10:00 AM ET at the PSP Academy Auditorium. Attendance is strongly suggested but not mandatory.
- 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 5: Are bids going through E-builder or will they be submitted in person? Instructions to bidders says the following: SECTION 5. SUBMISSION/SIGNING OF BIDS. All bids shall be submitted in e-Builder prior to the date and time scheduled for the bid opening. Only e-Builder submissions will be accepted by the Department. Mail (regular or express), email, or any other type of delivery of bid submissions will not be accepted by the Department and, if feasible, will be returned to sender. But E-builder says that Electronic Bid Submission is disabled, and hard copies need to be submitted.

- Response: As per response to question 4, proposals must be received by the Department of General Services in the Lobby of the Arsenal Building, 1800 Herr Street, Harrisburg, PA, prior to the Proposal Submission Deadline Date and Time regardless of method of delivery used. Please disregard the requirement for an electronic submission noted in the Instructions to Bidders.
- Question 6: Drawing STE-C-301 calls for "memorials to be removed - coordinate with owner and architect". We need to know what is to be coordinated so that we can price accordingly.
- Response: Under review. Response will be issued in a forthcoming Addendum.
- Question 7: Drawing STE-C-501 doesn't show top of wall elevations at the beginning and end of retaining wall at Gym building.
- Response: Refer to GYM-A-510 for top of retaining wall elevations.
- Question 8: Please confirm the radon piping is in the plumbing prime package.
- Response: The radon mitigation scope is that of the .1 General Contractor.
- Question 9: There are multiple references to buildings being occupied during construction. However, the drawings don't provide any phasing plan showing any buildings that need to remain during construction (except for Museum). Please advise on phasing.
- Response: Refer to revised specification section 013110 as issued in Addendum 25 for clarification on construction sequencing requirements.
- Question 10: The first addenda issued was number 24. Were previous addenda from the original bid already incorporated into the rebid documents?
- Response: Yes, per Addendum 24 General Changes Item 2, "Items issued in addendums from the previous bid process have been incorporated into the current, re-issued bid documents."
- Question 11: Please confirm FS-03 fixed tables are to be installed in Executive Lecture Hall M-1005. Those tables don't seem to be labeled on the drawings.
- Response: Confirmed, FS-03 fixed tables are to be installed in Executive Lecture Hall M-1005. Refer to revised MAQ-A-663 as issued in Addendum 25.
- Question 12: FS-02 seating and tables is labeled for room M-1007 on drawing MAQ-A-662. However, Lecture Halls M-1009, M-1011, M1-001, and M-1003 are not labeled with any type of seating and tables. Please advise.
- Response: Refer to MAQ-A-666, the typical plan for rooms M-1001, M-1003, M-1009, and M-1011, as referenced in the MAQ-A-121 and MAQ-A-122. Seating and tables are to be FS-02.
- Question 13: Most of the PFI items in this specification don't provide enough information or selection to know what to price and install. Please provide this information.
- Response: Under review. Response will be issued in a forthcoming Addendum.
- Question 14: Spec section 042000 lists Grade 60 hot-dipped galvanized rebar. Please confirm the masonry rebar is not required to be hot-dipped galvanized.
- Response: The hot-dipped galvanized is only required where specifically noted.
- Question 15: Please provide structural drawings for the Amphitheater Memorial Section and Amphitheater Wall shown on STE-A-701 and STE-A-701.
- Response: Amphitheater wall foundation is delegated design.
- Question 16: GEN-A-718 has a CMU span table with lists rebar details for interior walls. Please provide a CMU span table for exterior walls.
- Response: Per specification section 042000, CMU exterior wall shall be delegated design engineered per the performance criteria within the contract drawings and specifications.
- Question 17: Spec section 080350 Exterior Enclosure section 1.4 appears to indicate that a single contractor is required to design, fabricate, and install all of the exterior enclosure components for each building. This is not possible as it will take many different specialized trades to install all of the exterior wall components. Please confirm the .1 contractor can retain all of the specialized trades to complete this work.
- Response: Per specification section 080350, a single firm shall be retained for each principal type of work. Each of these firms are to be retained by the .1 General Contractor, who remains responsible for providing fully coordinated exterior building enclosure work. The scope should be determined such that each firm retained by the .1 General Contractor is responsible for the full scope of each specialized trade, and multiple firms are not retained for the same scope of work across the project.

SPECIFICATION CHANGES – ALL CONTRACTS

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

NUMBER / NAME / ACTION

013110 / Sequence of Construction and Milestones / Revised
274116 / Integrated Audio-Video Systems and Equipment / Revised
274116.51 / Integrated Audio-Video Systems and Equipment for Classrooms / Revised
274116.62 / Integrated Audio-Video Systems and Equipment for Auditoriums / 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

MAQ-A-658A / ENLARGED PLAN - AUDITORIUM / Revised (fixed furniture tagged)
MAQ-A-663 / ENLARGED PLANS-RCP - EXECUTIVE LECTURE HALL / Revised (fixed furniture tagged)
GEN-TC-001 / SYMBOL LIST AND GENERAL NOTES - TELECOMMUNICATIONS / Issued
GEN-TC-700 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-701 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-702 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-703 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-704 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-705 / DETAILS - TELECOMMUNICATIONS / Issued
GEN-TC-706 / DETAILS - TELECOMMUNICATIONS / Issued

SECTION 013110SEQUENCE OF CONSTRUCTION AND MILESTONESPART 1 – GENERAL

1.1 STIPULATIONS

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

1.2 GENERAL REQUIREMENTS

- A. Before beginning work, the Contractor will be required to prepare a Critical Path Method (CPM) Project Schedule in consultation with the Department and all of the other Prime Contractors. The work must be carried out in full accordance with the schedule. The Contractor shall arrange to perform the work without any unnecessary interference with the Institution's operation.
- B. The Project Schedule shall be developed in conformance with Article 8 of the General Conditions of the Contract, except as modified and/or augmented by this Section.
- C. The detailed Project Schedule shall be developed in accordance with the Contract Documents, with the General Contractor being the "Lead" Contractor. The Lead Contractor shall furnish each Prime Contractor a draft progress schedule of the proposed prosecution of the Work under that Contractor's Contract within seven (7) calendar days of the Effective Date of the Contract or the date directed in the Letter of Intent to Contract. All Prime Contractors must provide the required scheduling data for their work to the Lead Contractor within seven (7) calendar days of the receipt of the Lead Contractor's draft progress schedule to facilitate the development of the CPM schedule. The submission of the Project Schedule, and all subsequent updates, shall be done in eBuilder utilizing the scheduling software native file as well as in PDF format (including all requested sorts and arrangements, utilizing color print). The attachments in e-Builder shall include all unlocked data files in the **Primavera** scheduling system used to develop the schedule. The start date on the schedule shall be the Initial Job Conference and end with the Contract Completion Date. The final fully integrated and detailed Project Schedule, accepted by all Prime Contractors, must be submitted in eBuilder for Professional and Departmental acceptance within thirty (30) calendar days of the Effective Date of the Contract or the date directed in the Letter of Intent to Contract.
- D. The use of float suppression techniques, such as preferential sequencing (arranging the critical path through activities more susceptible to Client Agency or Department caused delays), special lead/lag logic restraints, zero total or free float constraints, extended activity times or imposing constraint dates other than as required by the contract, shall be cause for the rejection of the submitted project schedule or its updates. The use of Resource Leveling (or similar software features) used for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly forbidden.
- E. Contractors shall also track submissions, ordering dates and delivery of materials in the Project Schedule.
- F. A large sized copy of the accepted Project Schedule shall be maintained and posted in the DGS Construction Coordinators field office for access and monitoring of the progress of the work activities. At the direction of the Department, large sized copies of monthly schedule updates shall also be provided, posted and maintained in the DGS Construction Coordinators field office

1.3 CRITICAL MATERIALS AND EQUIPMENT

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

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

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

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

1.4 MILESTONES

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

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

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

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

- D. These prime contractor Milestones are not meant to be all inclusive for any contractor. It is each prime contractor's responsibility to understand the work required and to recognize and identify each critical Milestone and task required to complete the project on schedule. The Department reserves the right to add, delete and/or modify milestones at time of schedule review and acceptance or as necessary throughout the project.
- E. The milestones noted in this section of the specifications apply to all the Prime Contractors. The HVAC and Electrical Prime Contractors shall adhere to the milestones and incorporate their work activities into the Project Schedule in order to achieve the milestones for the project per the contract documents. (Example: wall rough in work must take place with the wall construction milestones, etc.).

1.5 PROJECT

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

1.6 CONSTRUCTION PROGRAM

- A. The entire scope of work for the Project (as indicated on the Drawings and Specifications, including all Addenda and modifications thereto) shall be completed within the time period outlined in this section of the specifications and in accordance with the hereinafter-specified requirements. It shall be the responsibility of each Prime Contractor to inform all suppliers and subcontractors (of any tier) of the construction program procedures. Due to the compressed time period for construction of this project, work activities shall be performed concurrently; thereby creating accelerated work and inefficient conditions. Each Prime Contractor shall recognize and acknowledge these working conditions will exist as a contractual inherent feature of this Project. Each Prime Contractor shall account for these conditions in their bid. No additional compensation will be paid for failing to include all requirements as set forth in the construction program.
- B. Time is of the essence for this Contract. Each Prime Contractor and all their subcontractors (of any tier) shall employ a sufficient number of qualified employees, supervision/management, equipment and project resources, required to meet the milestones and completion date established for this Project. Each Prime Contractor shall perform the Work on multiple shifts during each 24-hour day period, if needed, to meet all milestones and complete the interior work of the Project by the required completion date as set forth for this work. Proper supervision must be provided for all work activities. No work shall be covered or concealed during off-shift work activities in such a manner that it cannot be observed the morning of the next work shift by the Department of General Services. See section 1.6.E below regarding the Pennsylvania Department of Labor and Industries (L&I) inspections.
- C. Each Prime Contractor shall coordinate with the Department any scheduling requirements in order to avoid disruption of programs and activities, as well as to coordinate the location of the various structures to be constructed (i.e. temporary trailers, temporary construction fences, temporary enclosures, temporary partitions, etc.) All work performed under this Project shall be performed in a manner that will not disrupt the Client Agency's activities in and around the facility.

- D. All Prime Contractors are expected to work outside of normal work hours, in shifts and on weekends as necessary to maintain the Master Project Schedule. All Prime Contractors are to comply with noise levels restrictions in accordance with all local ordinances. This may require exterior work to be completed during the day shift only.
- E. Each Prime Contractor shall coordinate and schedule inspections as required by the provisions of the Building Permit issued by Pennsylvania Department of Labor and Industry (L&I). The L&I Inspectors will only be available during the day shift. L&I Inspectors availability does not constitute a delay to the progress of the Project and shall be considered when scheduling and completing the work of this Project.
- F. It is understood that during the duration of the Project, changes may be made to the Project Schedule without the Department incurring additional costs or granting extensions of time to the Contract.
- G. Change Orders will occur on this Project to address unforeseen conditions, errors and/or omissions in the documents and other potential reasons. It shall be mandatory that each Prime Contractor (along with all its subcontractors of any tier) provides necessary additional and separate work forces to accommodate these changes in a manner to eliminate any delays to milestones or the overall project schedule. The Department shall issue no Extension of Time for performance of Change Order work; all time must be recovered in the affected work activities.
- H. The Department reserves the right to delay or suspend any work, without compensation due any of the Contractors, if the Department determines that any work would disrupt activities in or around the facility.
- I. It shall be understood that there shall be a number of independent work activities occurring within this building by other means of procurement and by other contractors and vendors outside this Project. The other work activities shall commence prior to the Final Inspection and/or Punch List period for this Project. As such, each Prime Contractor shall have an affirmative duty to accommodate this effort while working with and cooperating with all these other entities, individually or collectively, as well as with the Department and Client Agency. The Milestones denoted in this section are established to define the anticipated sequence and identify the areas (as well as time frames) that must be completed to facilitate this effort. Reference paragraph 1.10 for a more detailed summary of anticipated "work by others". Each Prime Contractor shall provide the necessary additional supervision, project management and overall coordination necessary to avoid adversely affecting the work being performed by these other entities. Each Prime Contractor shall consider this condition and include any costs associated with this effort in their bids.
- J. The Department will notify the Prime Contractor(s) that they are in default of the Contract in the event that:
1. Any Prime Contractor fails to achieve any milestones established for the building program in accordance with the Contract Documents and the Project Schedule, or
 2. Any schedule update showing the work is behind schedule and the Project is in jeopardy of not meeting the milestone dates or the overall contract completion date.
- K. Unless directed otherwise by the Department, immediately upon the issuance of the Letter of Intent to Contract, each Prime Contractor shall begin the submittal process and shall have all critical submittal items for the project submitted through e-Builder to the Professional within fourteen (14) calendar days after the issuance date of the Letter of Intent to Contract (in accordance with paragraph 1.3 of this Section). All Prime Contractors shall submit their Priority Submittal Schedule to the Professional within seven (7) calendar days of the issuance date of the Letter of Intent to Contract. The project non-critical submittals shall be submitted to the Professional within forty-five (45) calendar days of issuance of the Letter of Intent to Contract, or sooner if needed to maintain the construction schedule. Any direction by the Department

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

- L. While time is of the essence, each Prime Contractor (as well as each of their subcontractors of any tier) shall not compromise the safety of any individuals while performing any of their work. Contractors shall take all the necessary precautions to maintain safety during the progress of the work including, but not limited to, barricades, signage, safety tape and rails, temporary ramps, temporary partitions, fencing, etc.
- M. The detailed Project Schedule will be developed in accordance with the Contract Documents, with the General Contractor being the "Lead" Contractor. The Lead Contractor shall facilitate an initial scheduling meeting with all Prime Contractors, DGS, Professional and Consultants within ten (10) calendar days of receipt of the Letter of Intent to Contract. All other Prime Contractors must provide the required scheduling data for their work to the Lead Contractor within five (5) calendar days of the initial schedule meeting to facilitate the development of the CPM schedule. The Lead Contractor shall facilitate a follow-up scheduling meeting within ten (10) calendar days of the initial schedule meeting (but in no event shall the follow-up meeting occur later than twenty (20) calendar days from the date of the Letter of Intent to Contract) to develop a final draft of the fully integrated Project Schedule. The final fully integrated and detailed Project Schedule, signed by all Prime Contractors, must be submitted for acceptance to the Department within forty-five (45) calendar days from the date of the Letter of Intent to Contract.
- N. Pre-installation meetings are required for many items and systems. The pre-installation meetings shall be held the same dates as the regularly scheduled bi-weekly job conferences. Each Prime Contractor shall coordinate with the Department any preinstallation meeting scheduling requirements in order to avoid delays in the installation of any items or systems requiring a pre-installation meeting. Each Prime Contractor requiring a pre-installation meeting to comply with the contract documents, shall request the meeting a minimum of two weeks prior to the scheduled installation of the item or system. Failure to request a pre-installation meeting in the required time period will not relieve the contractors of their responsibility to comply with all contract documents including but not limited to the Project Schedule. No additional compensation or extension of time will be granted by the Department to the contractors for their failure to schedule or attend any of the required pre-installation meetings.

1.7 MILESTONE NARRATIVE

- A. The following narrative is intended to assist the Contractors in understanding the potential flow of the work and enumerate some of the critical milestones that shall be incorporated into the Project Schedule.
- B. Contractors are advised that the schedule will require multiple crews to work concurrently in the building, and contractors are required to staff and equip the job accordingly.
- C. The Milestones noted in this portion of paragraph 1.7 are mandatory and shall be incorporated into the Project Schedule using the timeframes stated below. Conformance with Milestones shall be considered imposed activities with all related predecessors and successors tied to each milestone and the completion date. These activities must be constrained and any recovery plan (if needed) shall not affect any of the milestones established in this section.
- D. Any schedule update that indicates that these milestones are slipping must be immediately accompanied by a recovery plan that preserves all the milestone dates.
- E. Listing of milestones to be incorporated into the Project Schedule (in addition to the milestones added by each Prime Contractor to develop the schedule), include, but are not limited to the following:

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

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

1. Milestones - Completion of Construction Work

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

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

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

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

1.8 FURTHER CLARIFICATIONS

- A. By submitting a bid, each Contractor acknowledges that this abbreviated list of milestones for construction work (as provided in this section) was provided for informational purposes, and to ensure all Prime Contractors understand the critical mandatory completions/durations necessary to accommodate the requirements and sequence of completion to meet the needs of the Client Agency. It constitutes a proposed sequence of events based on standard construction practices and will not form the basis for any claims for inefficiency, acceleration or delays. The coordinated Project Schedule will be developed in accordance with this section and the Contract Documents by the Prime Contractors and the actual milestone dates for the project will be agreed upon by all Prime Contractors based on the accepted schedule.
- B. If there is a conflict between what is stated in Section 013110 and the General Conditions of the Construction Contract, the contract specifications, the contract drawing or the Administrative Procedures, the most stringent requirement within any of these documents shall prevail.

1.9 PROTECTION OF WORK AREAS

- A. All work areas common to the Lead Contractor and any other Prime Contractor shall be protected by the Lead Contractor.
- B. Each Prime Contractor shall protect all existing and/or completed equipment and finishes including all provisions for temporary floor and wall protection in the work areas.
- C. Where isolated work must be performed outside the partitioned work area, the Prime Contractor performing such work shall provide temporary dust/dirt protection for its work. Those areas shall be cleaned by this Prime Contractor before its employees leave the area each shift.

1.10 SEQUENCING OF CONSTRUCTION AND OTHER REQUIREMENTS

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

- c. **The existing Building and Grounds building shall remain operational until the client agency takes beneficial occupancy of the automotive building and grounds building (Construction of Automotive, Building & Grounds building not in contract).**
 - d. **The existing bureau of special operations headquarters shall remain operational until the client agency takes beneficial occupancy of the BESO building.**
 - e. **The existing water tower shall remain operational until such time as the pump house and campus domestic and fire water infrastructure is in place and operational, and no existing buildings remain operationally dependent on the water tower for the provision of domestic or fire water service.**
- B. The existing buildings listed below are not required to remain operational during construction, and may be demolished by the contractor no later than as required to maintain the critical path of the schedule. The timing of the demolition shall be shown in the master schedule and agreed upon by the Department of General Services in coordination with the client agency. Demolition shall be scheduled so as to further the flexibility of the contractor's means and methods, maintain the critical path, and minimize impact to the building occupants.**
- a. **Existing academy administrative wing**
 - b. **Academy shoot house**
 - c. **The kennels**
 - d. **The Applehurst Office building (demolition not in contract)**
- C. These milestones are intended only to assist the bidders in understanding the potential flow of the work and enumerate some of the critical milestones that will be incorporated into the Project Schedule. The contractors will be responsible for determining the actual order of the required milestones and the logic of the Project Schedule as required to complete the project in the time period indicated in the bid documents.
- D. Contractors are advised that the schedule may require multiple crews to work concurrently in areas of the building(s). Multiple areas may be worked concurrently, and contractors are required to supervise, staff and equip the job accordingly. Furthermore, per paragraph D below, multiple independent projects with separate prime contractors will be ongoing simultaneously on the site requiring coordination between contractors as noted in paragraph D below on such matters including, but not limited to, site access, logistics, parking & lay down area, installation of utilities and sequencing of the work.
- E. It shall be understood that there may be a number of independent work activities occurring on the site by other means of procurement and by other contractors and vendors outside this project. The other work activities may commence prior to the Final Inspection and/or Closeout Inspection for this project. As such, each prime Contractor shall have an affirmative duty to accommodate this effort while working with and cooperating with all these other entities, individually or collectively, as well as with the Department and Client Agency. The Milestones or items denoted in this section are established to define the anticipated sequence and identify the areas (as well as time frames) that must be completed to facilitate this effort. Each Prime Contractor shall provide the necessary supervision, project management and overall coordination necessary to expedite the work being performed by these other entities. Each Prime Contractor shall consider this condition and include any costs associates with this effort in their bids.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 274116
INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT

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. Work Included:

1. Equipment Mounting Hardware
2. Video Display Mounting Hardware
3. Power Distribution
4. Audio Source Equipment
5. Audio Distribution Equipment
6. Audio Amplification
7. Loudspeakers
8. Video Source Equipment
9. Video Distribution Equipment
10. Video Display Equipment
11. Control System Equipment
12. Control System User-Interface
13. Wire and Cable
14. Assistive Listening Equipment
15. Architectural Connectivity

1.2 RELATED SECTIONS

- A. Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.

- B. In addition, reference Section 11 52 13, Projection Screens.

1.3 REFERENCES AND STANDARDS

- A. References and Standards as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. BICSI/INFOCOMM AV Design Reference Manual.
 - 2. ANSI/INFOCOMM 2M-2010 Standard Guide for Audiovisual Systems Design and Coordination Processes.

1.4 SUBMITTALS

- A. Submittals as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, provide:
 - 1. Screen shots for touch panel user-interface.
 - 2. Shop drawings showing installation instructions, block wiring diagrams, component interconnections, custom faceplate layouts with labeling, device locations and literal descriptions.

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. A minimum of five years experience in the design, installation, testing and maintenance of commercial audio-video systems.
 - 2. Employ at least one full-time InfoCOMM Certified Technology Specialist (CTS) who is involved in reviewing work performed by Contractor on this project.
 - 3. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. See "Attachment A - Equipment" spreadsheet for each room requirements.

2.2 EQUIPMENT MOUNTING HARDWARE

A. Manufacturers:

1. Middle Atlantic
2. Lowell Manufacturing
3. Or approved equivalent.

B. Equipment Racks:

1. Type: 19-inch stand-alone equipment cabinet with vented side panels, vented locking rear door
2. Overall Dimensions: 84-inches high, 24-inches wide, 30-inches deep.
3. Usable Dimensions: 45 rack spaces, 28-inches deep.
4. Removable, key-locked side panels.
5. Black powder-coat finish.
6. UL listed.

C. Equipment Cabinet Accessories:

1. Blank rack-panels.
2. Vent panels.

D. In-Wall Equipment Racks:

1. Type: 19-inch wide, 19-inch deep, 45-inch high EIA/TIA compliant equipment rack.
2. Designed to be installed flush in wall cavity or void with sliding rail and 90-degree pivot rotation for maintenance purposes.
3. Black powder-coat finish.

2.3 VIDEO DISPLAY MOUNTING HARDWARE

A. Manufacturers:

1. Chief Manufacturing
2. Or approved equivalent.

- B. Projector Mounting Bracket:
 - 1. Plus or minus 4-degree roll adjustment.
 - 2. Plus or minus 25-degree pitch adjustment.
 - 3. 150-lb weight capacity.
- C. Flat-Panel Display Mounting:
 - 1. 17-1/2-inch lateral shift.
 - 2. Plus or minus 1/2-inch height adjustment.
 - 3. Mounts on 16-inch, 20-inch, or 24-inch stud spacing.
 - 4. Less than 2-inch depth from wall.
 - 5. 200-lb weight capacity.
- D. Mounting Accessories:
 - 1. Devices consist of plates, columns, clamps, brackets and adapters.
 - 2. All devices of steel construction using National Pipe Thread (NPT) and American National Standards Institute (ANSI) standards.
 - 3. Examples of Components Required:
 - a. 8-inch Ceiling plate with attached adjustable 1-1/2-inch NPT (column).
 - b. Angled ceiling adapter.
 - c. Adjustable extension column.
 - d. Fixed extension column, 1-foot length.
 - e. C-Clamp.

2.4 POWER DISTRIBUTION

- A. Manufacturers:
 - 1. Lowell Manufacturing
 - 2. Middle Atlantic
 - 3. Or approved equivalent.
- B. Rack-Mounted Power Distribution:

1. One front and eight rear NEMA 5-15R electrical outlets.
2. One 15-amp circuit.
3. Surge and spike protection.
4. 9-foot extension cable.
5. Black powder coat finish.
6. UL listed.

2.5 AUDIO SOURCE EQUIPMENT

A. Manufacturers:

1. Shure
2. Sennheiser
3. Audio-Technica
4. Or approved equivalent

B. Wireless Microphone Receivers:

1. UHF band operation.
2. 960 operating frequencies across 24 MHz of bandwidth.
3. Auto frequency selection.
4. Detachable 1/4-wave antennas.
5. 1/4-inch and XLR audio outputs.
6. Multifunction LCD display.
7. Provide with combination pack which includes a hand-held dynamic microphone and a body-pack with lavalier microphone.

C. Hand-Held Wired Microphones:

1. Dynamic (moving coil) type microphone.
2. 50-Hz to 16-kHz frequency response.
3. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.
4. Die-cast metal casing with spherical steel mesh grille.

- D. Boundary Wireless Microphones:
 - 1. Condenser (electret bias) type microphone.
 - 2. Cardioid polar pattern (at 1-kHz).
 - 3. Up to 100-foot operating range.
 - 4. Powered by two AA batteries, 8-hour battery life.
- E. Desktop Microphones:
 - 1. Microphone Base:
 - a. Logic enabled for LED and mute control.
 - b. Programmable mute switch (push-to-mute, push-to-talk, logic, local).
 - c. Low-cut filter.
 - d. 20-foot, attached microphone cable with 5-pin male XLR termination.
 - 2. Microphones:
 - a. Gooseneck construction, 10-inch length.
 - b. Condenser (electret bias) type microphone.
 - c. 50-Hz to 17-kHz frequency response.
 - d. Cardioid polar pattern.
 - e. Bi-color status indicator.

2.6 AUDIO DISTRIBUTION EQUIPMENT

- A. DSP Audio Matrix Mixer:
 - 1. Manufacturers:
 - a. Biamp Systems - Tesira Server I/O
 - b. Or approved equivalent.
 - 2. Up to 24-input/output modular design.
 - 3. Software programmable features include:
 - a. Standard, automatic and matrix mixers.
 - b. Graphic and parametric equalization.

- c. Dynamic Processing: Compression, limiting and ducking.
- d. Digital delay up to 2000-ms.
4. Bi-directional RS-232 control port for control via third-party control systems.
5. Ethernet-ready network port for network control and monitoring.

2.7 AUDIO AMPLIFICATION

A. Manufacturers:

1. QSC Audio
2. Or approved equivalent

B. Audio Power Amplifier:

1. Minimum 800W (70-volt, 1-kHZ, 0.05-percent total harmonic distortion).
2. 20-Hz to 20-kHz frequency response, plus or minus 2-dB.
3. 3-pin XLR and 3-pin detachable terminal block input connectors.
4. Short circuit, open circuit, thermal, ultrasonic and RF protection.
5. On/off muting, DC-fault power supply shutdown.
6. 70-volt isolation transformer.

2.8 LOUDSPEAKERS

A. Manufacturers:

1. JBL, Inc.
2. Or approved equivalent.

B. Flush Ceiling-Mount Passive Loudspeaker:

1. 6.5-inch coaxial woofer and 3/4-inch tweeter.
2. 89-dB SPL nominal sensitivity (1-W at 1 meter).
3. 150-W continuous program power capacity.
4. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
5. 110-degree nominal dispersion, conical coverage.
6. Formed steel, UL-listed back can.

7. Include mounting hardware and paintable grille.
- C. Flush Wall-Mount Passive Loudspeaker:
1. 6.5-inch woofer and 1-inch tweeter.
 2. 88-dB SPL nominal sensitivity (1-W at 1 meter).
 3. 100-W continuous program power capacity.
 4. 70-Volt Multi-Tap Transformer: 30-W, 15-W, 7.5-W and 3.7-W taps.
 5. Supply with rough-in frame.
- D. Surface-Mount Passive Loudspeaker:
1. 8-inch woofer and 1-inch tweeter.
 2. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
 3. 102-dB SPL nominal sensitivity (15-W tap at 1 meter).
 4. 175-W continuous program power capacity.
 5. 90-degree horizontal and 90-degree vertical nominal coverage angle.
 6. Weather-resistant enclosure and transducers.
 7. Surface mounting assembly and hardware.
 8. Include additional mounting hardware where applicable:

2.9 VIDEO SOURCE EQUIPMENT

- A. Provide a rack mounted PC dedicated for the AV system - PC is to have a built-in DVD/Blu Ray Player
- B. Manufacturers:
1. Wolfvision
 2. Or approved equivalent.
- C. Document Camera:
1. Camera:
 - a. 1/3-inch CMOS sensor.
 - b. Effective Pixel Capture: 1,280 horizontal, 1,024 vertical.

- c. Frame Rate: 30 frames per second.
- 2. Optics:
 - a. Powered, 16x optical zoom lens.
 - b. Shooting Area: Up to 16-inch horizontal, 12-inch vertical.
 - c. Full-auto, one-shot and manual focus options.
- 3. Additional Features: White balance and 8x digital zoom.
- 4. Interface:
 - a. Analog RGB input and output on D-sub HD15 connectors.
 - b. Digital output on DVI-D connector.
 - c. Composite video output on RCA connector.
 - d. SD memory card port.

2.10 VIDEO DISTRIBUTION EQUIPMENT

- A. Manufacturers:
 - 1. Crestron
 - 2. Or approved equivalent.
- B. Digital Audio-Video Matrix Switcher:
 - 1. 8-input/8-output or 16-input/16-output modular design. Input modules must accept HDMI, DVI, RGBHV, standard analog video formats.
 - 2. Capable of receiving and distributing uncompressed digital video and audio over shielded twisted-pair cabling.
 - 3. Support video resolutions up to WUXGA (1920x1200) and HD 1080p60.
 - 4. HDCP content protection support.
 - 5. Software and front-panel setup and diagnostic tools.
 - 6. Ethernet-ready network port.
 - 7. Provides power to remote devices from internal power supply, 110W (4.6A, 24V DC).
- C. Digital Audio-Video Matrix Switcher Accessories:

1. HDMI Input Module:
 - a. HDMI input, capable of accepting DVI and DisplayPort Multimode signals when used with an appropriate cable adapter.
 - b. HDCP content protection support.
 - c. Local HDMI and stereo audio outputs.
 - d. Compatible with Digital Audio-Video Matrix Switcher.
 2. Twisted-Pair/HDBASE-T Input Module:
 - a. Accepts input from remote audio-video input devices via shielded twisted-pair cabling.
 - b. Twisted-pair input receive audio, video and control signals from remote devices.
 - c. HDCP content protection support.
 - d. Local HDMI, stereo audio, control signal and remote device power outputs.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
 3. DVI/RGB Input Module:
 - a. Video input accepts DVI digital video input or analog RGB/component video signals.
 - b. Local balanced stereo audio input and HDMI output.
 - c. HDCP content protection support.
 - d. Device must include an RGB to DVI-I adapter.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
 4. Twisted-Pair/HDBASE-T Output Module:
 - a. Transmits audio-video signals over shielded twisted-pair cabling.
 - b. Compatible with Digital Audio-Video Matrix Switcher.
- D. All-In-One Presentation Switcher:
1. 6-input/2-output, 6-input/3-output, or 10-input/4-output design.
 2. Includes video input capable of component, composite, S-video and RGB-type video signals.

3. Includes HDMI and twisted-pair/HDBASE-T inputs/outputs.
4. Includes control system with RS-232, IR and relay ports.
5. Includes audio amplifier with 70V transformer isolated output.

2.11 VIDEO DISPLAY EQUIPMENT

A. Manufacturers:

1. Mitsubishi
2. Samsung
3. Panasonic
4. Or approved equivalent.

B. Video Projector:

1. Minimum 7000 lumen.
2. 16:10 aspect ratio.
3. Up to 4K resolution.
4. Digital and analog inputs.
5. Include zoom lens.

2.12 CONTROL SYSTEM EQUIPMENT

A. Manufacturers:

1. Crestron
2. Or approved equivalent.

B. Control System Processor:

1. Real-time, event driven, multi-tasking, multi-threaded operating system with dual-bus architecture.
2. Six bi-directional RS-232/422/485 ports, supporting baud rates up to 115.2-k baud.
3. Eight infrared/serial outputs. IR output up to 1.2 MHz, serial up to 115.2-k baud.
4. Eight digital input/output ports, which can also be used as analog input ports.
5. Eight relay outputs rated 1A, 30V AC/DC.

6. Expansion slots for expansion modules.

2.13 CONTROL SYSTEM USER-INTERFACE

A. Manufacturers:

1. Crestron
2. Or approved equivalent.

B. Control System Interface:

1. Touch-panel with 4.9-inch diagonal TFT active matrix color LCD, 16:9 aspect ratio, 800x480-pixel resolution, 1000:1 contrast ratio and projected capacitive, multi-touch screen.
2. 512-MB SDRAM, 4-GB flash memory.
3. Ethernet-ready network port.
4. Flush wall-mount with back-box or Surface-mount with desktop base.

2.14 WIRE AND CABLE

A. Manufacturers:

1. Crestron
2. Belden
3. Liberty Wire & Cable
4. West Penn Wire
5. Or approved equivalent.

B. Cable and Adapter Types:

1. Microphone-level and line-level audio cable 22 AWG, stranded conductors, shielded. Plenum-rated.
2. Loudspeaker-level cable, 18 AWG, stranded, two conductors. Plenum-rated.
3. High resolution RGBHV cable, 25 AWG, five coaxial conductors. Plenum-rated.
4. Combination audio/RGBHV cable, pre-terminated with 3.5 mm audio and HD15 male to HD15 female connectors, 6-foot length. Plenum-rated.
5. Control cable for RS-232 communications applications with quantity of conductors as required by manufacturer's specifications for each controlled device. Plenum-

rated.

6. Control cable for electric projection screen. Comply with screen and control system manufacturer's specifications. Plenum-rated.
7. High-performance HDMI cable, 22 AWG minimum, supports data rates up to 4.95 Gbps; HDMI 1.3 Category 2 compliant, pre-terminated with male connectors. Plenum-rated.
8. High-performance HDMI-to-DisplayPort crossover cable. Plenum-rated.
9. Pre-terminated VGA cable, 6-foot length. Plenum-rated.
10. Shielded Cat6A for HDBASE-T applications. To be installed by Division 27, Section 27 15 00, Communications Horizontal Cabling, provider.

2.15 ASSISTIVE LISTENING EQUIPMENT

- A. Manufacturers:
 1. Listen Technologies
 2. Or approved equivalent.
- B. RF Wireless Assistive Listening System:
 1. Combo WiFi/RF system
 2. WiFi Server appliance
 3. Remote antenna.
 4. Wireless three-channel FM receivers
 5. Assistive listening signage kit.

2.16 ARCHITECTURAL CONNECTIVITY

- A. Manufacturers:
 1. Connectors and Jacks:
 - a. Neutrik
 - b. Switchcraft
 - c. Liberty Wire & Cable
 - d. Or approved equivalent.
 2. Twisted-Pair/HDBASE-T:

- a. Crestron
 - b. Or approved equivalent.
- B. Custom A-V Outlet Plates:
 - 1. Flush-mounted, stainless-steel faceplates.
 - 2. Jack/connector configuration as shown on Drawings.
 - 3. Size as shown on Drawings, to fit in industry standard back box unless specifically noted otherwise.
 - 4. Label jacks and connectors as indicated on Drawings, with 1/4-inch Arial-type font.
- C. Twisted-Pair/HDBASE-T:
 - 1. Transmitter:
 - a. Two auto-switched inputs (HDMI and VGA with 3.5 mm stereo audio).
 - b. Transmits audio-video signals over Crestron Digital Media cable.
 - c. USB port which supports USB HID class devices.
 - d. Fits in standard double-gang box with double-gang decora type faceplate.
 - e. Compatible with switcher.
 - 2. Receiver:
 - a. HDBASE-T input, digital video output.
 - b. RS-232 or other method for two-way communications between control system and display.
 - c. HDCP content protection support.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Examination: Examine areas and conditions under which audio-video equipment will be installed. Notify Professional of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Install complete system in strict accordance with manufacturer's recommendations. Complete electrical connections to all system components.

- C. Install wiring in raceways where routed through inaccessible areas. Use J-hooks for cable installed in areas with accessible ceilings.
- D. Install equipment so it is held firmly in place. This includes racks, rack equipment, loudspeakers, control equipment, conduit, etc.
- E. Label switches, jacks, outlets, etc. in a logical and readable manner. Labels are to correspond with connection designations on shop drawings.
- F. Do not install electronic equipment in any space until other work within the space has been completed, to prevent dust, dirt, debris, etc. from damaging equipment.
- G. Mount modules for modular equipment in strict accordance with manufacturer's specifications.
- H. Store loose devices and cables in rack-mounted drawers, cabinets, or Department-approved location. Notify Department of location of loose devices and cables during training.
- I. Wiring:
 - 1. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA), Electronic Industries Alliance (EIA) and NEC. Meet established Commonwealth and local electrical codes.
 - 2. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
 - 3. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.
- J. System Programming:
 - 1. Programming of the control systems and user interfaces is the responsibility of the A-V Contractor. Program the user interface using manufacturer supplied configuration software and templates.
 - 2. Program the control system and user-interface to provide novice-level functionality with features including, but not limited to, the following:
 - a. Display power on/off.
 - b. Source selection of audio and video devices.
 - c. Volume control of all audio sources.
 - d. Power on/off and source selection of video displays.
 - e. Display system and device status.

- f. Control of dimmable lighting zones.
- g. Control of projection screens and motorized shades.

K. Performance Requirements:

- 1. Coordinate with Division 26, Electrical for installation of electrical service, raceways, conduit, back boxes and the like, necessary to support the systems specified.
- 2. Conceal wiring in walls and ceiling spaces during construction.
- 3. Determine requirements for plenum-rated cable. When doubt exists, seek determination in writing by AHJ prior to ordering.

L. Inspection and Testing Upon Completion:

- 1. Verify that projectors are adjusted such that the projected image fills the projection screen at the center of its zoom range.
- 2. Warranty materials and installation to be free of defects in material and workmanship after final acceptance of installation and test per Division 01, General Requirements.
- 3. Upon completion of the installation, furnish copies of complete operational instructions, complete with record drawings. Include part numbers and names, addresses and telephone numbers of parts source. One hard copy and two digital copies on CD required for materials.
- 4. Nothing contained in this specification to be construed to relieve the Contractor from furnishing a complete and acceptable system in all its categories. The Professional will reject any materials or labor that are or may become detrimental to the accomplishment of the intents of these Specifications.

M. Training:

- 1. Provide Department with manufacturer's operating instructions.
- 2. Provide representatives to instruct the Department's personnel in the operation of each system, its components and equipment.
- 3. Demonstrate to the Department all system features and operations.
- 4. Provide comprehensive training for the Department's Authorized Representative for the operation, maintenance and troubleshooting of the systems. Provide two copies of configuration data file for control systems and touch-panel user interfaces on CD.

N. Clean-Up:

1. Remove unused materials and debris from the work and storage areas. Leave areas in an undamaged and acceptable condition.
2. Save the shipping boxes for the Department in case of need to return product for service.

3.2 EQUIPMENT MOUNTING HARDWARE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Fasten free-standing equipment racks to the floor using a minimum of four 3/8-inch concrete anchors. In raised floor areas, secure equipment racks to the concrete floor below.
- D. Position free-standing equipment racks according to the Drawings with a minimum of 3 feet clearance in front. Report any discrepancies to the Professional.
- E. Mount equipment within rack as shown in rack elevations on Drawings.
- F. Fill unused rack space with blank rack panels.

3.3 VIDEO DISPLAY MOUNTING HARDWARE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Position projector mounting hardware according to the Drawings, fastened to structure.
- D. Size extension columns so the projector lens aligns to the top of the projection screen.
- E. Coordinate backing requirements for flat-panel display mounting hardware with Professional prior to rough-in.

3.4 POWER DISTRIBUTION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Mount power distribution in rack as shown in rack elevations on Drawings.
- D. Connect equipment cords from rack-mounted equipment to the power distribution unit.

3.5 AUDIO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.6 AUDIO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.7 AUDIO AMPLIFICATION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install amplifiers that will supply sufficient power to speakers without exceeding 70% of the amplifier's maximum rated output power
- D. Audio Signal Routing: Furnish and install required signal routing mixers, equalizers, or processors such that the user can produce and route an audio signal to any location or equipment within the system.
- E. Speakers: Furnish and install flush mounted ceiling speakers of professional commercial grade. Locate speakers as noted on drawings.

3.8 LOUDSPEAKERS

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.9 VIDEO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.10 VIDEO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.11 VIDEO DISPLAY EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.12 CONTROL SYSTEM EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.13 CONTROL SYSTEM USER-INTERFACE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.14 WIRE AND CABLE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA), Electronic Industries Alliance (EIA) and NEC. Meet established commonwealth and local electrical codes.
- D. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
- E. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.
- F. Label cables using a machine printed label, at each end of the cable within 12-inches of the termination point. Handwritten labels are not permitted. Labels to correspond with cable designations on shop drawings.

3.15 ASSISTIVE LISTENING EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install an assistive listening system located as indicated on the drawings.
- D. Ensure User signal is clearly receivable at any point within the room where the transmitter is located.
- E. Provide the minimum number of assistive listening user headsets or neck loops required by Code.

3.16 ARCHITECTURAL CONNECTIVITY

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Input Plates:
 - 1. Furnish and install user equipment input plates in the locations indicated and per the details shown on the drawings.

2. Furnish and install active input plates where cabling exceeds the maximum distance limitations for signal transmission.
3. Input plates are to have, at a minimum, an HDMI input into the A/V system.

END OF SECTION 274116

MARQUEE BUILDING-1

Equipment	Room #					Budget Designation
	Conference M-0337	Large Conference M-0344	Major's Office M-0355	Director's Conf M-0357	OTD Captain Office M-0359	PIP = Capital Construction FFE = Furniture and Fixture
Projector	NA	NA	NA	NA	NA	
Monitor	LG 55UR340C	LG 86UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	FFE
Audio Reinforcement Speakers	NA	NA	NA	NA	NA	
Wireless Microphone System	NA	NA	NA	NA	NA	
Wired Microphones	NA	NA	NA	NA	NA	
Control Panel	NA	NA	NA	NA	NA	
AV Cabinet	NA	NA	NA	NA	NA	
Power Supply	NA	NA	NA	NA	NA	
Control	Remote for Monitor	Remote for Monitor	Remote for Monitor	Remote for Monitor	Remote for Monitor	FFE
Video Matrix	NA	NA	NA	NA	NA	
DSP	NA	NA	NA	NA	NA	
POE Switch	NA	NA	NA	NA	NA	
Amplifier	NA	NA	NA	NA	NA	
Assisted Listen System	WiFi	NA	NA	NA	NA	
Floor Box AV inputs	NA	NA	NA	NA	NA	
Wall AV inputs	NA	NA	NA	NA	NA	

MARQUEE BUILDING-2

Equipment	Room #					Budget Designation
	Captain's Office M-0361	Small Conference M-0378	Hallway Signage Monitors Area D Stairwell Lobby Level 2 Level 3 Level 4	Signage Monitors Area D Stairwell Level 1 Lobby Cafeteria	Digital Signage at Breakout Area M-0300	
Projector	NA	NA	NA	NA	NA	
Monitor	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 86UR340C	FFE
Audio Reinforcement Speakers	NA	NA	NA	NA	NA	
Wireless Microphone System	NA	NA	NA	NA	NA	
Wired Microphones	NA	NA	NA	NA	NA	
Control Panel	NA	NA	NA	NA	NA	
AV Cabinet	NA	NA	NA	NA	NA	
Power Supply	NA	NA	NA	NA	NA	
Control	Remote for Monitor	Remote for Monitor	Remote for Monitor	Remote for Monitor	Remote for Monitor	FFE
Video Matrix	NA	NA	NA	NA	NA	
DSP	NA	NA	NA	NA	NA	
POE Switch	NA	NA	NA	NA	NA	
Amplifier	NA	NA	NA	NA	NA	
Assisted Listen System	WiFi	NA	NA	NA	NA	
Floor Box AV inputs	NA	NA	NA	NA	NA	
Wall AV inputs	NA	NA	NA	NA	NA	

PIP = Capital Construction
FFE = Furniture and Fixture

GYMNASIUM BUILDING

Equipment	Room #				Budget Designation
	Cadet Gym G-125	Flexible Gym G-120	Weight Training G-150		
Projector	Panasonic PT-RZ990BU with standard lens	Panasonic PT-RZ990BU with standard lens	NA		FFE
Monitor	NA	NA	LG 55UR340C		FFE
Audio Reinforcement Speakers	JBL Pro Control 64 P/T	JBL Pro Control 64 P/T	JBL Pro Control 64 P/T		FFE
Wireless Microphone System	Shure SLXD124/85	Shure SLXD124/85	NA		FFE
Wired Microphones	NA	NA	NA		
Control Panel	Crestron TSW-770	Crestron TSW-770	NA		FFE
AV Cabinet	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	NA		FFE
Power Supply	Furman P-8 PRO C	Furman P-8 PRO C	NA		FFE
Control	Crestron CP-4N	Crestron CP-4N	NA		FFE
Video Matrix	Crestron DM-MD6X4	Crestron DM-MD6X4	NA		FFE
DSP	Biamp Tesira I/O	Biamp Tesira I/O	NA		FFE
POE Switch	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	NA		FFE
Amplifier	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti		FFE
Assisted Listen System	Listen Tech LCS-120-01	Listen Tech LCS-120-01	NA		FFE
Floor Box AV inputs	NA	NA	NA		
Wall AV inputs	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	NA		PIP

PIP = Capital Construction
FFE = Furniture and Fixture

BESO BUILDING-1

Equipment	Room #					Budget Designation
	Gun Cleaning Area B-103	HDES Robot Mnt Area B-112	K9-Offices B-121 B-122 B-123 B-124	SERT Admin B-210	HDES Admin B-203	
Projector	NA	NA	NA	NA	NA	PIP = Capital Construction FFE = Furniture and Fixture
Monitor	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	
Audio Reinforcement Speakers	NA	NA	NA	NA	NA	
Wireless Microphone System	NA	NA	NA	NA	NA	
Wired Microphones	NA	NA	NA	NA	NA	
Control Panel	NA	NA	NA	NA	NA	
AV Cabinet	NA	NA	NA	NA	NA	
Power Supply	NA	NA	NA	NA	NA	
Control	Remote	Remote	Remote	Remote	Remote	FFE
Video Matrix	NA	NA	NA	NA	NA	
DSP	NA	NA	NA	NA	NA	
POE Switch	NA	NA	NA	NA	NA	
Amplifier	NA	NA	NA	NA	NA	
Assisted Listen System	NA	NA	NA	NA	NA	
Floor Box AV inputs	NA	NA	NA	NA	NA	
Wall AV inputs	NA	NA	NA	NA	NA	

BESO BUILDING-2

Equipment	Room #					Budget Designation
	HDES LDR Offices B-204 B-205	ESS Supervisor Office B-245	Section CMDR Offices B-230 B-231 B-242	BESO Admin B-227	BESO Directors Office B-232	
Projector	NA	NA	NA	NA	NA	PIP = Capital Construction FFE = Furniture and Fixture
Monitor	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	
Audio Reinforcement Speakers	NA	NA	NA	NA	NA	
Wireless Microphone System	NA	NA	NA	NA	NA	
Wired Microphones	NA	NA	NA	NA	NA	
Control Panel	NA	NA	NA	NA	NA	
AV Cabinet	NA	NA	NA	NA	NA	
Power Supply	NA	NA	NA	NA	NA	
Control	Remote	Remote	Remote	Remote	Remote	FFE
Video Matrix	NA	NA	NA	NA	NA	
DSP	NA	NA	NA	NA	NA	
POE Switch	NA	NA	NA	NA	NA	
Amplifier	NA	NA	NA	NA	NA	
Assisted Listen System	NA	NA	NA	NA	NA	
Floor Box AV inputs	NA	NA	NA	NA	NA	
Wall AV inputs	NA	NA	NA	NA	NA	

BESO BUILDING-3

Equipment	Room #					Budget Designation
	Director Tactical OPS B-233	CDR Special Services B-234	ESS Support Office B-245	Plant Room #1 B-268	Plant Room #1 B-267	
Projector	NA	NA	NA	NA	NA	
Monitor	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	LG 55UR340C	FFE
Audio Reinforcement Speakers	NA	NA	NA	NA	NA	
Wireless Microphone System	NA	NA	NA	NA	NA	
Wired Microphones	NA	NA	NA	NA	NA	
Control Panel	NA	NA	NA	NA	NA	
AV Cabinet	NA	NA	NA	NA	NA	
Power Supply	NA	NA	NA	NA	NA	
Control	Remote	Remote	Remote	Remote	Remote	FFE
Video Matrix	NA	NA	NA	NA	NA	
DSP	NA	NA	NA	NA	NA	
POE Switch	NA	NA	NA	NA	NA	
Amplifier	NA	NA	NA	NA	NA	
Assisted Listen System	NA	NA	NA	NA	NA	
Floor Box AV inputs	NA	NA	NA	NA	NA	
Wall AV inputs	NA	NA	NA	NA	NA	

PIP = Capital Construction
FFE = Furniture and Fixture

BESO BUILDING-4

Equipment	Room #			Budget Designation	
	SERT Briefing Room B-208	BESO Conf Room B-240	Fitness Center B-214		
Projector	Panasonic PT-RZ690BU with standard lens	Panasonic PT-RZ690BU with standard lens	NA		FFE
Monitor	LG 75UR340C	LG 55UR340C	LG 55UR340C		FFE
Audio Reinforcement Speakers	JBL Control 26CT	JBL Control 26CT	NA		PIP
Wireless Microphone System	Shure SLXD124/85	Shure SLXD124/85	NA		FFE
Wired Microphones	NA	NA	NA		PIP
Control Panel	Crestron TSW-770	Crestron TSW-770	NA		PIP
AV Cabinet	Middle Atlantic SRSR cabinet rack	Middle Atlantic SRSR cabinet rack	NA		FFE
Power Supply	Furman P-8 PRO C	Furman P-8 PRO C	NA		FFE
Control	Crestron CP-4N	Crestron CP-4N	NA		FFE
Video Matrix	Crestron DM-MD6X4	Crestron DM-MD6X4	NA		FFE
DSP	Biamp Tesira I/O	Biamp Tesira I/O	NA		FFE
POE Switch	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	NA		FFE
Amplifier	QSC ISA800Ti	QSC ISA800Ti	NA		FFE
Assisted Listen System	Listen Tech LCS-120-01	Listen Tech LCS-120-01	NA		FFE
Floor Box AV inputs	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	NA		PIP
Wall AV inputs	NA	NA	NA		PIP

PIP = Capital Construction
FFE = Furniture and Fixture

SECTION 274116.51
INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT FOR CLASSROOMS

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. Work Included:

1. Equipment Mounting Hardware
2. Video Display Mounting Hardware
3. Power Distribution
4. Audio Source Equipment
5. Audio Distribution Equipment
6. Audio Amplification
7. Loudspeakers
8. Video Source Equipment
9. Video Distribution Equipment
10. Video Display Equipment
11. Control System Equipment
12. Control System User-Interface
13. Wire and Cable
14. Assistive Listening Equipment
15. Architectural Connectivity

1.2 RELATED SECTIONS

- A. Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.

- B. In addition, reference Section 11 52 13, Projection Screens.

1.3 REFERENCES AND STANDARDS

- A. References and Standards as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. BICSI/INFOCOMM AV Design Reference Manual.
 - 2. ANSI/INFOCOMM 2M-2010 Standard Guide for Audiovisual Systems Design and Coordination Processes.

1.4 SUBMITTALS

- A. Submittals as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, provide:
 - 1. Screen shots for touch panel user-interface.
 - 2. Shop drawings showing installation instructions, block wiring diagrams, component interconnections, custom faceplate layouts with labeling, device locations and literal descriptions.

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. A minimum of five years experience in the design, installation, testing and maintenance of commercial audio-video systems.
 - 2. Employ at least one full-time InfoCOMM Certified Technology Specialist (CTS) who is involved in reviewing work performed by Contractor on this project.
 - 3. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 GENERAL

- A. See "Attachment A - Equipment" spreadsheet for each room requirements.

2.2 EQUIPMENT MOUNTING HARDWARE

A. Equipment Racks:

1. Manufacturers:
 - a. Middle Atlantic
 - b. Lowell Manufacturing
 - c. Or approved equivalent.
2. Type: 19-inch stand-alone equipment cabinet with vented side panels, vented locking rear door
3. Overall Dimensions: 84-inches high, 24-inches wide, 30-inches deep.
4. Usable Dimensions: 45 rack spaces, 28-inches deep.
5. Removable, key-locked side panels.
6. Black powder-coat finish.
7. UL listed.

B. Equipment Cabinet Accessories:

1. Manufacturers:
 - a. Middle Atlantic
 - b. Lowell Manufacturing
 - c. Or approved equivalent.
2. Blank rack-panels.
3. Vent panels.

C. In-Wall Equipment Racks:

1. Manufacturers:
 - a. Middle Atlantic
 - b. Or approved equivalent.

2. Type: 19-inch wide, 19-inch deep, 45-inch high EIA/TIA compliant equipment rack.
3. Designed to be installed flush in wall cavity or void with sliding rail and 90-degree pivot rotation for maintenance purposes.
4. Black powder-coat finish.

2.3 VIDEO DISPLAY MOUNTING HARDWARE

A. Manufacturers:

1. Chief Manufacturing
 - a. Projector Mounting Bracket: RPA Series
 - b. Flat-Panel Display Mounting: LSM Series
 - c. Adjustable Extension Column: CMS Series
2. Or approved equivalent.

B. Projector Mounting Bracket:

1. Plus or minus 4-degree roll adjustment.
2. Plus or minus 25-degree pitch adjustment.
3. 150-lb weight capacity.

C. Flat-Panel Display Mounting:

1. 17-1/2-inch lateral shift.
2. Plus or minus 1/2-inch height adjustment.
3. Mounts on 16-inch, 20-inch, or 24-inch stud spacing.
4. Less than 2-inch depth from wall.
5. 200-lb weight capacity.

D. Mounting Accessories:

1. Devices consist of plates, columns, clamps, brackets and adapters.
2. All devices of steel construction using National Pipe Thread (NPT) and American National Standards Institute (ANSI) standards.
3. Examples of Components Required:
 - a. 8-inch Ceiling plate with attached adjustable 1-1/2-inch NPT (column).

- b. Angled ceiling adapter.
- c. Adjustable extension column.
- d. Fixed extension column, 1-foot length.
- e. C-Clamp.

2.4 POWER DISTRIBUTION

- A. Manufacturers:
 - 1. Lowell Manufacturing
 - 2. Middle Atlantic
 - 3. Or approved equivalent.
- B. Rack-Mounted Power Distribution:
 - 1. One front and eight rear NEMA 5-15R electrical outlets.
 - 2. One 15-amp circuit.
 - 3. Surge and spike protection.
 - 4. 9-foot extension cable.
 - 5. Black powder coat finish.
 - 6. UL listed.

2.5 AUDIO SOURCE EQUIPMENT

- A. Manufacturers:
 - 1. Shure
 - 2. Sennheiser
 - 3. Audio-Technica
 - 4. Or approved equivalent.
- B. Wireless Microphone Receivers:
 - 1. UHF band operation.
 - 2. 960 operating frequencies across 24 MHz of bandwidth.
 - 3. Auto frequency selection.

4. Detachable 1/4-wave antennas.
 5. 1/4-inch and XLR audio outputs.
 6. Multifunction LCD display.
 7. Provide with combination pack which includes a hand-held dynamic microphone and a body-pack with lavalier microphone.
- C. Hand-Held Wired Microphones:
1. Dynamic (moving coil) type microphone.
 2. 50-Hz to 16-kHz frequency response.
 3. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.
 4. Die-cast metal casing with spherical steel mesh grille.
- D. Boundary Wireless Microphones:
1. Condenser (electret bias) type microphone.
 2. Cardioid polar pattern (at 1-kHz).
 3. Up to 100-foot operating range.
 4. Powered by two AA batteries, 8-hour battery life.
- E. Desktop Microphones:
1. Microphone Base:
 - a. Logic enabled for LED and mute control.
 - b. Programmable mute switch (push-to-mute, push-to-talk, logic, local).
 - c. Low-cut filter.
 - d. 20-foot, attached microphone cable with 5-pin male XLR termination.
 2. Microphones:
 - a. Gooseneck construction, 10-inch length.
 - b. Condenser (electret bias) type microphone.
 - c. 50-Hz to 17-kHz frequency response.
 - d. Cardioid polar pattern.

- e. Bi-color status indicator.

2.6 AUDIO DISTRIBUTION EQUIPMENT

A. DSP Audio Matrix Mixer:

1. Manufacturer:
 - a. Biamp System - Tesira Server I/O
 - b. or approved equivalent.
2. Up to 24-input/output modular design.
3. Software programmable features include:
 - a. Standard, automatic and matrix mixers.
 - b. Graphic and parametric equalization.
 - c. Dynamic Processing: Compression, limiting and ducking.
 - d. Digital delay up to 2000-ms.
4. Bi-directional RS-232 control port for control via third-party control systems.
5. Ethernet-ready network port for network control and monitoring.

2.7 AUDIO AMPLIFICATION

A. Audio Power Amplifier:

1. Manufacturer:
 - a. QSC Audio
 - b. Or approved equivalent.
2. Minimum 800W (70-volt, 1-kHZ, 0.05-percent total harmonic distortion).
3. 20-Hz to 20-kHz frequency response, plus or minus 2-dB.
4. 3-pin XLR and 3-pin detachable terminal block input connectors.
5. Short circuit, open circuit, thermal, ultrasonic and RF protection.
6. On/off muting, DC-fault power supply shutdown.
7. 70-volt isolation transformer.

2.8 LOUDSPEAKERS

- A. Manufacturers:
 - 1. JBL, Inc.
 - 2. Or approved equivalent.

- B. Flush Ceiling-Mount Passive Loudspeaker:
 - 1. 6.5-inch coaxial woofer and 3/4-inch tweeter.
 - 2. 89-dB SPL nominal sensitivity (1-W at 1 meter).
 - 3. 150-W continuous program power capacity.
 - 4. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
 - 5. 110-degree nominal dispersion, conical coverage.
 - 6. Formed steel, UL-listed back can.
 - 7. Include mounting hardware and paintable grille.

- C. Flush Wall-Mount Passive Loudspeaker:
 - 1. 6.5-inch woofer and 1-inch tweeter.
 - 2. 88-dB SPL nominal sensitivity (1-W at 1 meter).
 - 3. 100-W continuous program power capacity.
 - 4. 70-Volt Multi-Tap Transformer: 30-W, 15-W, 7.5-W and 3.7-W taps.
 - 5. Supply with rough-in frame.

- D. Surface-Mount Passive Loudspeaker:
 - 1. 8-inch woofer and 1-inch tweeter.
 - 2. 70-Volt Multi-Tap Transformer: 60-W, 30-W, 15-W and 7.5-W taps.
 - 3. 102-dB SPL nominal sensitivity (15-W tap at 1 meter).
 - 4. 175-W continuous program power capacity.
 - 5. 90-degree horizontal and 90-degree vertical nominal coverage angle.
 - 6. Weather-resistant enclosure and transducers.
 - 7. Surface mounting assembly and hardware.
 - 8. Include additional mounting hardware where applicable:

2.9 VIDEO SOURCE EQUIPMENT

- A. Provide a rack mounted PC dedicated for the AV system - PC is to have built-in DVD/Blu Ray Payer
- B. Manufacturers:
 - 1. Wolfvision
 - 2. Or approved equivalent.
- C. Document Camera:
 - 1. Camera:
 - a. 1/3-inch CMOS sensor.
 - b. Effective Pixel Capture: 1,280 horizontal, 1,024 vertical.
 - c. Frame Rate: 30 frames per second.
 - 2. Optics:
 - a. Powered, 16x optical zoom lens.
 - b. Shooting Area: Up to 16-inch horizontal, 12-inch vertical.
 - c. Full-auto, one-shot and manual focus options.
 - 3. Additional Features: White balance and 8x digital zoom.
 - 4. Interface:
 - a. Analog RGB input and output on D-sub HD15 connectors.
 - b. Digital output on DVI-D connector.
 - c. Composite video output on RCA connector.
 - d. SD memory card port.

2.10 VIDEO DISTRIBUTION EQUIPMENT

- A. Manufacturers:
 - 1. Crestron
 - 2. Or approved equivalent.
- B. Digital Audio-Video Matrix Switcher:

1. 8-input/8-output or 16-input/16-output modular design. Input modules must accept HDMI, DVI, RGBHV, standard analog video formats.
 2. Capable of receiving and distributing uncompressed digital video and audio over shielded twisted-pair cabling.
 3. Support video resolutions up to WUXGA (1920x1200) and HD 1080p60.
 4. HDCP content protection support.
 5. Software and front-panel setup and diagnostic tools.
 6. Ethernet-ready network port.
 7. Provides power to remote devices from internal power supply, 110W (4.6A, 24V DC).
- C. Digital Audio-Video Matrix Switcher Accessories:
1. HDMI Input Module:
 - a. HDMI input, capable of accepting DVI and DisplayPort Multimode signals when used with an appropriate cable adapter.
 - b. HDCP content protection support.
 - c. Local HDMI and stereo audio outputs.
 - d. Compatible with Digital Audio-Video Matrix Switcher.
 2. Twisted-Pair/HDBASE-T Input Module:
 - a. Accepts input from remote audio-video input devices via shielded twisted-pair cabling.
 - b. Twisted-pair input receive audio, video and control signals from remote devices.
 - c. HDCP content protection support.
 - d. Local HDMI, stereo audio, control signal and remote device power outputs.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
 3. DVI/RGB Input Module:
 - a. Video input accepts DVI digital video input or analog RGB/component video signals.
 - b. Local balanced stereo audio input and HDMI output.

- c. HDCP content protection support.
 - d. Device must include an RGB to DVI-I adapter.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
4. Twisted-Pair/HDBASE-T Output Module:
- a. Transmits audio-video signals over shielded twisted-pair cabling.
 - b. Compatible with Digital Audio-Video Matrix Switcher.
- D. All-In-One Presentation Switcher:
- 1. 6-input/2-output, 6-input/3-output, or 10-input/4-output design.
 - 2. Includes video input capable of component, composite, S-video and RGB-type video signals.
 - 3. Includes HDMI and twisted-pair/HDBASE-T inputs/outputs.
 - 4. Includes control system with RS-232, IR and relay ports.
 - 5. Includes audio amplifier with 70V transformer isolated output.

2.11 VIDEO DISPLAY EQUIPMENT

- A. Manufacturers:
- 1. Mitsubishi
 - 2. Samsung
 - 3. Panasonic
 - 4. Or approved equivalent.
- B. Video Projector:
- 1. Minimum 7000 lumen.
 - 2. 16:10 aspect ratio.
 - 3. Up to 4K resolution.
 - 4. Digital and analog inputs.
 - 5. Include zoom lens.

2.12 CONTROL SYSTEM EQUIPMENT

- A. Manufacturers:
 - 1. Crestron
 - 2. Or approved equivalent.
- B. Control System Processor:
 - 1. Real-time, event driven, multi-tasking, multi-threaded operating system with dual-bus architecture.
 - 2. Six bi-directional RS-232/422/485 ports, supporting baud rates up to 115.2-k baud.
 - 3. Eight infrared/serial outputs. IR output up to 1.2 MHz, serial up to 115.2-k baud.
 - 4. Eight digital input/output ports, which can also be used as analog input ports.
 - 5. Eight relay outputs rated 1A, 30V AC/DC.
 - 6. Expansion slots for expansion modules.

2.13 CONTROL SYSTEM USER-INTERFACE

- A. Manufacturers:
 - 1. Crestron
 - 2. Or approved equivalent.
- B. Control System Interface:
 - 1. Touch-panel with 4.9-inch diagonal TFT active matrix color LCD, 16:9 aspect ratio, 800x480-pixel resolution, 1000:1 contrast ratio and projected capacitive, multi-touch screen.
 - 2. 512-MB SDRAM, 4-GB flash memory.
 - 3. Ethernet-ready network port.
 - 4. Flush wall-mount with back-box or Surface-mount with desktop base.

2.14 WIRE AND CABLE

- A. Manufacturers
 - 1. Crestron
 - 2. Belden
 - 3. Liberty Wire & Cable

4. West Penn Wire
 5. Or approved equivalent.
- B. Cable and Adapter Types:
1. Microphone-level and line-level audio cable 22 AWG, stranded conductors, shielded. Plenum-rated.
 2. Loudspeaker-level cable, 18 AWG, stranded, two conductors. Plenum-rated.
 3. High resolution RGBHV cable, 25 AWG, five coaxial conductors. Plenum-rated.
 4. Combination audio/RGBHV cable, pre-terminated with 3.5 mm audio and HD15 male to HD15 female connectors, 6-foot length. Plenum-rated.
 5. Control cable for RS-232 communications applications with quantity of conductors as required by manufacturer's specifications for each controlled device. Plenum-rated.
 6. Control cable for electric projection screen. Comply with screen and control system manufacturer's specifications. Plenum-rated.
 7. High-performance HDMI cable, 22 AWG minimum, supports data rates up to 4.95 Gbps; HDMI 1.3 Category 2 compliant, pre-terminated with male connectors. Plenum-rated.
 8. High-performance HDMI-to-DisplayPort crossover cable. Plenum-rated.
 9. Pre-terminated VGA cable, 6-foot length. Plenum-rated.
 10. Shielded Cat6A for HDBASE-T applications. To be installed by Division 27, Section 27 15 00, Communications Horizontal Cabling, provider.

2.15 ASSISTIVE LISTENING EQUIPMENT

- A. Manufacturers
1. Listen Technologies
 2. Or approved equivalent.
- B. RF Wireless Assistive Listening System:
1. Combo WiFi/RF system
 2. WiFi Server appliance
 3. Remote antenna.

4. Wireless three-channel FM receivers
5. Assistive listening signage kit.

2.16 ARCHITECTURAL CONNECTIVITY

A. Manufacturers:

1. Connectors and Jacks:
 - a. Neutrik
 - b. Switchcraft
 - c. Liberty Wire & Cable
 - d. Or approved equivalent.
2. Twisted-Pair/NDBASE-T:
 - a. Crestron
 - b. Or approved equivalent.

B. Custom A-V Outlet Plates:

1. Flush-mounted, stainless-steel faceplates.
2. Jack/connector configuration as shown on Drawings.
3. Size as shown on Drawings, to fit in industry standard back box unless specifically noted otherwise.
4. Label jacks and connectors as indicated on Drawings, with 1/4-inch Arial-type font.

C. Twisted-Pair/HDBASE-T:

1. Transmitter:
 - a. Two auto-switched inputs (HDMI and VGA with 3.5 mm stereo audio).
 - b. Transmits audio-video signals over Crestron Digital Media cable.
 - c. USB port which supports USB HID class devices.
 - d. Fits in standard double-gang box with double-gang decora type faceplate.
 - e. Compatible with switcher.
2. Receiver:

- a. HDBASE-T input, digital video output.
- b. RS-232 or other method for two-way communications between control system and display.
- c. HDCP content protection support.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Examination: Examine areas and conditions under which audio-video equipment will be installed. Notify Professional of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- B. Install complete system in strict accordance with manufacturer's recommendations. Complete electrical connections to all system components.
- C. Install wiring in raceways where routed through inaccessible areas. Use J-hooks for cable installed in areas with accessible ceilings.
- D. Install equipment so it is held firmly in place. This includes racks, rack equipment, loudspeakers, control equipment, conduit, etc.
- E. Label switches, jacks, outlets, etc. in a logical and readable manner. Labels are to correspond with connection designations on shop drawings.
- F. Do not install electronic equipment in any space until other work within the space has been completed, to prevent dust, dirt, debris, etc. from damaging equipment.
- G. Mount modules for modular equipment in strict accordance with manufacturer's specifications.
- H. Store loose devices and cables in rack-mounted drawers, cabinets, or Department-approved location. Notify Department of location of loose devices and cables during training.
- I. Wiring:
 - 1. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA), Electronic Industries Alliance (EIA) and NEC. Meet established Commonwealth and local electrical codes.
 - 2. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
 - 3. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.
- J. System Programming:

1. Programming of the control systems and user interfaces is the responsibility of the A-V Contractor. Program the user interface using manufacturer supplied configuration software and templates.
 2. Program the control system and user-interface to provide novice-level functionality with features including, but not limited to, the following:
 - a. Display power on/off.
 - b. Source selection of audio and video devices.
 - c. Volume control of all audio sources.
 - d. Power on/off and source selection of video displays.
 - e. Display system and device status.
 - f. Control of dimmable lighting zones.
 - g. Control of projection screens and motorized shades.
- K. Performance Requirements:
1. Coordinate with Division 26, Electrical for installation of electrical service, raceways, conduit, back boxes and the like, necessary to support the systems specified.
 2. Conceal wiring in walls and ceiling spaces during construction.
 3. Determine requirements for plenum-rated cable. When doubt exists, seek determination in writing by AHJ prior to ordering.
- L. Inspection and Testing Upon Completion:
1. Verify that projectors are adjusted such that the projected image fills the projection screen at the center of its zoom range.
 2. Warranty materials and installation to be free of defects in material and workmanship after final acceptance of installation and test per Division 01, General Requirements.
 3. Upon completion of the installation, furnish copies of complete operational instructions, complete with record drawings. Include part numbers and names, addresses and telephone numbers of parts source. One hard copy and two digital copies on CD required for materials.
 4. Nothing contained in this specification to be construed to relieve the Contractor from furnishing a complete and acceptable system in all its categories. The Professional will reject any materials or labor that are or may become detrimental to the accomplishment of the intents of these Specifications.

- M. Training:
1. Provide Department with manufacturer's operating instructions.
 2. Provide representatives to instruct the Department's personnel in the operation of each system, its components and equipment.
 3. Demonstrate to the Department all system features and operations.
 4. Provide comprehensive training for the Department's Authorized Representative for the operation, maintenance and troubleshooting of the systems. Provide two copies of configuration data file for control systems and touch-panel user interfaces on CD.
- N. Clean-Up:
1. Remove unused materials and debris from the work and storage areas. Leave areas in an undamaged and acceptable condition.
 2. Save the shipping boxes for the Department in case of need to return product for service.

3.2 EQUIPMENT MOUNTING HARDWARE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Fasten free-standing equipment racks to the floor using a minimum of four 3/8-inch concrete anchors. In raised floor areas, secure equipment racks to the concrete floor below.
- D. Position free-standing equipment racks according to the Drawings with a minimum of 3 feet clearance in front. Report any discrepancies to the Professional.
- E. Mount equipment within rack as shown in rack elevations on Drawings.
- F. Fill unused rack space with blank rack panels.

3.3 VIDEO DISPLAY MOUNTING HARDWARE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Position projector mounting hardware according to the Drawings, fastened to structure.
- D. Size extension columns so the projector lens aligns to the top of the projection screen.
- E. Coordinate backing requirements for flat-panel display mounting hardware with Professional prior to rough-in.

3.4 POWER DISTRIBUTION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Mount power distribution in rack as shown in rack elevations on Drawings.
- D. Connect equipment cords from rack-mounted equipment to the power distribution unit.

3.5 AUDIO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.6 AUDIO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.7 AUDIO AMPLIFICATION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install amplifiers that will supply sufficient power to speakers without exceeding 70% of the amplifier's maximum rated output power
- D. Audio Signal Routing: Furnish and install required signal routing mixers, equalizers, or processors such that the user can produce and route an audio signal to any location or equipment within the system.
- E. Speakers: Furnish and install flush mounted ceiling speakers of professional commercial grade. Locate speakers as noted on drawings.

3.8 LOUDSPEAKERS

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.9 VIDEO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.10 VIDEO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.11 VIDEO DISPLAY EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.12 CONTROL SYSTEM EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.13 CONTROL SYSTEM USER-INTERFACE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.14 WIRE AND CABLE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA), Electronic Industries Alliance (EIA) and NEC. Meet established Commonwealth and local electrical codes.
- D. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
- E. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.
- F. Label cables using a machine printed label, at each end of the cable within 12-inches of the termination point. Handwritten labels are not permitted. Labels to correspond with cable designations on shop drawings.

3.15 ASSISTIVE LISTENING EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install an assistive listening system located as indicated on the drawings.

- D. Ensure User signal is clearly receivable at any point within the room where the transmitter is located.
- E. Provide the minimum number of assistive listening user headsets or neck loops required by Code.

3.16 ARCHITECTURAL CONNECTIVITY

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Input Plates:
 - 1. Furnish and install user equipment input plates in the locations indicated and per the details shown on the drawings.
 - 2. Furnish and install active input plates where cabling exceeds the maximum distance limitations for signal transmission.
 - 3. Input plates are to have, at a minimum, an HDMI input into the A/V system.

END OF SECTION 274116.51

Attachment A - Equipment for Classrooms

MARQUEE BUILDING					
Equipment	Room #				
	60 Person Flat Classroom M-1002	60 Person Flat Classroom M-1004	PCO Lab M-1006	Lecture Hall M-1001	Lecture Hall M-1003
Projector	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens
Monitor	NA	NA	NA	NA	NA
Audio Reinforcement Speakers	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT
Wireless Microphone System	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85
Wired Microphones	Audix M3	Audix M3	Audix M3	Audix M3	Audix M3
Control Panel	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770
AV Cabinet	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV
Power Supply	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C
Control	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N
Video Matrix	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4
DSP	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O
POE Switch	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16
Amplifier	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti
Assisted Listen System	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01
Floor Box AV inputs	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G
Wall AV inputs	NA	NA	NA	NA	NA

MARQUEE BUILDING

	Room #				
Projector	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens	Panasonic PT-RZ690BU with ET-DLE030 lens
Monitor	NA	NA	NA	NA	NA
Audio Reinforcement Speakers	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT	JBL Control 26CT
Wireless Microphone System	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85	Shure SLXD124/85
Wired Microphones	Audix M3	Audix M3	Audix M3	Audix M3	Audix M3
Control Panel	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770	Crestron TSW-770
AV Cabinet	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV	Middle Atlantic ERK-4425-AV
Power Supply	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C	Furman P-8 PRO C
Control	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N	Crestron CP-4N
Video Matrix	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4	Crestron DM-MD6X4
DSP	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O	Biamp Tesira I/O
POE Switch	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16
Amplifier	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti	QSC ISA800Ti
Assisted Listen System	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01	Listen Tech LCS-120-01
Floor Box AV inputs	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G
Wall AV inputs	NA	NA	NA	NA	NA

MARQUEE BUILDING

		Room #			
Equipment	60 Person Lecture Hall M-1011				
Projector	Panasonic PT-RZ690BU with ET-DLE030 lens				
Monitor	NA				
Audio Reinforcement Speakers	JBL Control 26CT				
Wireless Microphone System	Shure SLXD124/85				
Wired Microphones	Audix M3				
Control Panel	Crestron TSW-770				
AV Cabinet	Middle Atlantic ERK- 4425-AV				
Power Supply	Furman P-8 PRO C				
Control	Crestron CP-4N				
Video Matrix	Crestron DM-MD6X4				
DSP	Biamp Tesira I/O				
POE Switch	Crestron CEN-SWPOE- 16				
Amplifier	QSC ISA800Ti				
Assisted Listen System	Listen Tech LCS-120-01				
Floor Box AV inputs	Crestron DM-TX-200-C- 2G				
Wall AV inputs	NA				

BESO BUILDING

Equipment	Room #					Budget Designation
	K9 Classroom B-129	Classroom B-218				
Projector	Panasonic PT-RZ690BU with standard lens	Panasonic PT-RZ690BU with standard lens				FFE
Monitor	NA	LG 75UR340C				FFE
Audio Reinforcement Speakers	JBL Control 26CT	JBL Control 26CT				PIP
Wireless Microphone System	Shure SLXD124/85	Shure SLXD124/85				FFE
Wired Microphones	NA	NA				PIP
Control Panel	Crestron TSW-770	Crestron TSW-770				PIP
AV Cabinet	Middle Atlantic SRSR cabinet rack	Middle Atlantic SRSR cabinet rack				FFE
Power Supply	Furman P-8 PRO C	Furman P-8 PRO C				FFE
Control	Crestron CP-4N	Crestron CP-4N				FFE
Video Matrix	Crestron DM-MD6X4	Crestron DM-MD6X4				FFE
DSP	Biamp Tesira I/O	Biamp Tesira I/O				FFE
POE Switch	Crestron CEN-SWPOE-16	Crestron CEN-SWPOE-16				FFE
Amplifier	QSC ISA800Ti	QSC ISA800Ti				FFE
Assisted Listen System	Listen Tech LCS-120-01	Listen Tech LCS-120-01				FFE
Floor Box AV inputs	NA	Crestron DM-TX-200-C-2G				PIP
Wall AV inputs	Crestron DM-TX-200-C-2G	Crestron DM-TX-200-C-2G				PIP

PIP = Capital Construction
FFE = Furniture and Fixture

FTU BUILDING

FTU BUILDING						
Equipment	Classroom F-134	Room #				Budget Designation
						PIP = Capital Construction FFE = Furniture and Fixture
Projector	Panasonic PT-RZ690BU with standard lens					FFE
Monitor	NA					
Audio Reinforcement Speakers	JBL Control 26CT					PIP
Wireless Microphone System	Shure SLXD124/85					FFE
Wired Microphones	NA					PIP
Control Panel	Crestron TSW-770					PIP
AV Cabinet	Middle Atlantic SRSR cabinet rack					FFE
Power Supply	Furman P-8 PRO C					FFE
Control	Crestron CP-4N					FFE
Video Matrix	Crestron DM-MD6X4					FFE
DSP	Biamp Tesira I/O					FFE
POE Switch	Crestron CEN-SWPOE-16					FFE
Amplifier	QSC ISA800Ti					FFE
Assisted Listen System	Listen Tech LCS-120-01					FFE
Floor Box AV inputs	NA					PIP
Wall AV inputs	Crestron DM-TX-200-C-2G					PIP

SECTION 274116.62
INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT FOR AUDITORIUMS

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. Work Included:

1. Equipment Mounting Hardware
2. Video Display Mounting Hardware
3. Power Distribution
4. Audio Source Equipment
5. Ceiling Microphones
6. Audio Distribution Equipment
7. Audio Amplification
8. Loudspeakers
9. Video Source Equipment
10. Video Distribution Equipment
11. Video Display Equipment
12. Control System Equipment
13. Wire and Cable
14. Assistive Listening Equipment
15. Architectural Connectivity

1.2 RELATED SECTIONS

- A. Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.

- B. In addition, reference the following:
 - 1. Section 11 52 13, Projection Screens.

1.3 REFERENCES AND STANDARDS

- A. References and Standards as required by Section 27 00 00, Communications Basic Requirements Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. BICSI/INFOCOMM AV Design Reference Manual.
 - 2. ANSI/INFOCOMM 1M-2009 Audio Coverage Uniformity in Enclosed Listener Areas.
 - 3. ANSI/INFOCOMM 2M-2010 Standard Guide for Audiovisual Systems Design and Coordination Processes.

1.4 SUBMITTALS

- A. Submittals as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, provide:
 - 1. Control system and touch panel programming plan.
 - 2. Shop drawings showing installation instructions, block wiring diagrams, component interconnections, custom faceplate layouts with labeling, device locations and literal descriptions.

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.
- B. In addition, meet the following:
 - 1. Minimum of five years experience in the design, installation, testing and maintenance of commercial audio-video systems.
 - 2. Must employ at least one full-time InfoCOMM Certified Technology Specialist (CTS) who is involved in reviewing work performed by Contractor on this project.
 - 3. Maintain a local service facility which stocks spare devices and/or components for servicing systems.

1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Section 27 00 00, Communications Basic Requirements and Division 01, General Requirements.

1.7 APPROVALS AND SUBSTITUTIONS

- A. Provide products as specified without exception, unless approved in writing prior to bidding.
- B. Remove and replace non-compliant products installed as part of this Contract. Contractor to bear costs associated with removal and replacement of products

PART 2 - PRODUCTS

2.1 GENERAL

- A. See "Attachment A - Equipment" spreadsheet for each room requirements.

2.2 EQUIPMENT MOUNTING HARDWARE

- A. Manufacturers:

1. Middle Atlantic
2. Chatsworth
3. Panduit
4. Or approved equivalent.

- B. Equipment Racks:

1. Type: 19-inch stand-alone equipment rack with vented side panels, vented locking front and rear door
2. Overall Dimensions: 83-1/8-inches high, 24-1/4-inches wide, 27-1/2-inches deep,
3. Usable Dimensions: 44-rack spaces, 25-3/4-inches deep.
4. Removable, key-locked side panels.
5. Black powder-coat finish.
6. UL Listed.

- C. Equipment Cabinet Accessories:

1. Blank rack-panels.
2. Vent panels.

2.3 VIDEO DISPLAY MOUNTING HARDWARE:

- A. Projector Mounting Bracket:
 - 1. Manufacturers:
 - a. Chief Manufacturing: RPA Series
 - b. Or approved equivalent
 - 2. plus or minus 4-degree roll adjustment.
 - 3. plus or minus 25-degree pitch adjustment.
 - 4. 50-lb weight capacity.

- B. Flat-Panel Display Mounting:
 - 1. Manufacturers:
 - a. Chief Manufacturing: LSM Series
 - b. Or approved equivalent
 - 2. 17-1/2-inch lateral shift.
 - 3. Plus or minus 1/2-inch height adjustment.
 - 4. Mounts on 16-inch, 20-inch, or 24-inch stud spacing.
 - 5. Less than 2-inch depth from wall.
 - 6. 200-lb weight capacity.

- C. Mounting Accessories:
 - 1. Devices consist of plates, columns, clamps, brackets and adapters.
 - 2. All devices of steel construction using National Pipe Thread (NPT) and American National Standards Institute standards (ANSI).
 - 3. Examples of Components Required:
 - a. 8-inch ceiling plate with attached adjustable 1-1/2-inch NPT (column).
 - b. Angled ceiling adapter.
 - c. Adjustable extension column: CMS Series
 - d. Fixed extension column, 1-foot length.
 - e. C-Clamp.

2.4 POWER DISTRIBUTION

- A. Manufacturers:
 - 1.
 - 2.
- B. Rack-Mounted Power Distribution:
 - 1. One front and eight rear NEMA 5-15R electrical outlets.
 - 2. One 15-amp circuit.
 - 3. Surge and spike protection.
 - 4. 9-foot extension cable.
 - 5. Black powder coat finish.
 - 6. UL Listed.

2.5 AUDIO SOURCE EQUIPMENT

- A. Manufacturers:
 - 1. Shure, Incorporated
 - 2. Or approved equivalent.
- B. Wireless Microphone Receivers:
 - 1. 524-MHz to 865-MHz UHF band operation.
 - 2. 960 operating frequencies across 24-MHz of bandwidth.
 - 3. Auto frequency selection.
 - 4. Detachable 1/4-wave antennas.
 - 5. 1/4-inch and XLR audio outputs.
 - 6. Multi-function LCD display.
- C. Body-Pack Wireless Transmitters:
 - 1. -10-dBV maximum input level at mic gain position, +10-dBV maximum input level at 0-dB position, +20-dBV maximum at -10-dB position.
 - 2. 30-dB gain adjustment range.

3. 30-mW maximum RF transmitter output.
 4. Powered by two AA batteries, 8-hour battery life.
- D. Hand-Held Wireless Microphone Transmitters:
1. Transmitter:
 - a. +2-dBV maximum input level at -10-dB position, -8-dBV maximum at 0-dB position.
 - b. 10-dB gain adjustment range.
 - c. 30-mW maximum RF transmitter output.
 - d. Powered by two AA batteries, 8-hour battery life.
 2. Microphone:
 - a. Dynamic (moving coil) type microphone.
 - b. 50-Hz to 16-kHz frequency response.
 - c. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.
 - d. Die-cast metal casing with spherical steel mesh grille.
- E. Hand-Held Wired Microphones for Voice:
1. Dynamic (moving coil) type microphone.
 2. 50-Hz to 16-kHz frequency response.
 3. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.
 4. Die-cast metal casing with spherical steel mesh grille.
- F. Wired Microphones for Instrument:
1. Dynamic (moving coil) type microphone.
 2. 50-Hz to 16-kHz frequency response.
 3. Super-cardioid polar pattern, rotationally symmetrical about microphone axis, uniform with frequency.
 4. Die-cast metal casing with spherical steel mesh grille.
- G. Lavalier Wireless Microphones:

1. Condenser (electret bias) type microphone.
2. 50-Hz to 17-kHz frequency response.
3. Cardioid polar pattern.
4. 102.5-dB dynamic range.

2.6 AUDIO DISTRIBUTION EQUIPMENT

A. Manufacturers:

- 1.
2. Or approved equivalent.

B. DSP Audio Matrix Mixer:

1. 8-input, 8-output, 12-input, 4-output, or 4-input, 12-output.
2. Software programmable features include:
 - a. Standard, automatic and matrix mixers.
 - b. Graphic and parametric equalization.
 - c. Dynamic processing: Compression, limiting and ducking.
 - d. Digital delay up to 2000-ms.
3. Bi-directional RS-232 control port for control via third-party control systems.
4. Ethernet-ready network port for network control and monitoring.

2.7 AUDIO AMPLIFICATION

A. Audio Power Amplifier:

1.
 - a.
 - b.
2. Minimum 800W (70-volt, 1-kHZ, 0.05-percent total harmonic distortion).
3. 20-Hz to 20-kHz frequency response, +/- 0.2-dB.
4. 3-pin XLR and 3-pin detachable terminal block input connectors.
5. Short circuit, open circuit, thermal, ultrasonic and RF protection.

6. On/off muting, DC-fault power supply shutdown.
7. 70-volt isolation transformer.

2.8 LOUDSPEAKERS

A. Manufacturers:

1. JBL, Incorporated
2. Or approved equivalent.

B. Flush Ceiling-Mount Passive Loudspeaker:

1. 6.5-inch coaxial woofer and 3/4-inch tweeter.
2. 89-dB SPL nominal sensitivity (1-W at 1-meter).
3. 150-W continuous program power capacity.
4. 70-volt multi-tap transformer: 60-W, 30-W, 15-W and 7.5-W taps.
5. 110-degree nominal dispersion, conical coverage.
6. Formed steel, UL-listed back can.
7. Include mounting hardware and paintable grille.

C. Flush Wall-Mount Passive Loudspeaker:

1. 6.5-inch woofer and 1-inch tweeter.
2. 88-dB SPL nominal sensitivity (1-W at 1-meter).
3. 100-W continuous program power capacity.
4. 70-volt multi-tap transformer: 30-W, 15-W, 7.5-W and 3.7-W taps.
5. Supply with JBL, Inc. MTC-126RIF rough-in frame.

D. Surface-Mount Passive Loudspeaker:

1. 8-inch woofer and 1-inch tweeter.
2. 70-volt multi-tap transformer: 60-W, 30-W, 15-W and 7.5-W taps.
3. 102-dB SPL nominal sensitivity (15-W tap at 1-meter).
4. 175-W continuous program power capacity.
5. 90-degree horizontal and 90-degree vertical nominal coverage angle.

6. Weather-resistant enclosure and transducers.
7. Surface mounting assembly and hardware.
8. Include additional mounting hardware where applicable.

2.9 VIDEO SOURCE EQUIPMENT

- A. Provide a rack mounted PC dedicated for the AV system - PC is to have a built-in DVD/Blu Ray player.

2.10 VIDEO DISTRIBUTION EQUIPMENT

- A. Manufacturers:

1. Crestron
2. Or approved equivalent.

- B. Digital Audio-Video Matrix Switcher:

1. 8-input/8-output or 16-input/16-output modular design. Input modules must accept HDMI, DVI, RGBHV, standard analog video formats.
2. Capable of receiving and distributing uncompressed digital video and audio over shielded twisted-pair cabling.
3. Support video resolutions up to WUXGA (1920x1200) and HD 1080p60.
4. HDCP content protection support.
5. Software and front-panel setup and diagnostic tools.
6. Ethernet-ready network port.
7. Provides power to remote devices from internal power supply, 110W (4.6A, 24V DC).

- C. Digital Audio-Video Matrix Switcher Accessories:

1. HDMI Input Module:
 - a. HDMI input, capable of accepting DVI and DisplayPort Multimode signals when used with an appropriate cable adapter.
 - b. HDCP content protection support.
 - c. Local HDMI and stereo audio outputs.
 - d. Compatible with Digital Audio-Video Matrix Switcher.

2. Twisted-Pair Input Module:
 - a. Accepts input from remote audio-video input devices via shielded twisted-pair cabling.
 - b. Twisted-pair input receive audio, video and control signals from remote devices.
 - c. HDCP content protection support.
 - d. Local HDMI, stereo audio, control signal and remote device power outputs.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
3. DVI/RGB Input Module:
 - a. Video input accepts DVI digital video input or analog RGB/component video signals.
 - b. Local balanced stereo audio input and HDMI output.
 - c. HDCP content protection support.
 - d. Device must include an RGB to DVI-I adapter.
 - e. Compatible with Digital Audio-Video Matrix Switcher.
4. Twisted-Pair Output Module:
 - a. Transmits audio-video signals over shielded twisted-pair cabling.
 - b. Compatible with Digital Audio-Video Matrix Switcher.

2.11 VIDEO DISPLAY EQUIPMENT

- A. Manufacturers:
 1. Mitsubishi
 2. Samsung
 3. Panasonic
 4. Or approved equivalent.
- B. Video Projector:
 1. 7000 ANSI lumens.
 2. 16:10 aspect ratio.

3. Up to 4K resolution.
4. HDMI video inputs.
5. RS-232 control port.

2.12 CONTROL SYSTEM EQUIPMENT

A. Manufacturers:

1. Crestron
2. Or approved equivalent.

B. Control System Processor:

1. Real-time, event driven, multi-tasking, multi-threaded operating system with dual-bus architecture.
2. Six bi-directional RS-232/422/485 ports, supporting baud rates up to 115.2-k baud.
3. Eight infrared/serial outputs. IR output up to 1.2 MHz, serial up to 115.2-k baud.
4. Eight digital input/output ports, which can also be used as analog input ports.
5. Eight relay outputs rated 1A, 30V AC/DC.
6. Expansion slots for expansion modules.
7. Supply with Windows-based graphical programming software for drag-and-drop, object-oriented programming.

2.13 CONTROL SYSTEM USER-INTERFACE

A. Manufacturers:

1. Crestron
2. Or approved equivalent.

B. Control system interface:

1. Touch-panel with 12-inch diagonal TFT active matrix color LCD, 4:3 aspect ratio, 800x600-pixel resolution, 1000:1 contrast ratio, 24-bit color depth and resistive membrane touch screen.
2. One programmable push-button.
3. 1-GB SDRAM, 2-GB flash memory.
4. Ethernet-ready network port.

5. Composite video input port.
6. Built-in microphone and amplified speakers.
7. Supply with control system interface hardware.
8. Flush wall mount with back-box or Surface-mount with desktop base.

2.14 WIRE AND CABLE

A. Manufacturers

1. Crestron
2. Belden
3. Liberty Wire & Cable
4. West Penn Wire
5. Or approved equivalent.

B. Cable and Adapter Types:

1. Microphone-level and line-level audio cable 22 AWG, stranded conductors, shielded. Plenum-rated.
2. Loudspeaker-level cable, 18AWG, stranded, 2 conductors. Plenum-rated.
3. High resolution RGBHV cable, 25 AWG, five coaxial conductors. Plenum-rated.
4. Combination audio/RGBHV cable, 25 AWG, five coaxial conductors. Plenum-rated.
5. Control cable for RS-232 communications applications with quantity of conductors as required by manufacturer's specifications for each controlled device. Plenum-rated.
6. Loudspeaker-level cable, 18 AWG, stranded, 2 conductors.
7. High resolution RGBHV cable, 25 AWG, five coaxial conductors.
8. Combination audio/RGBHV cable, pre-terminated with 3.5mm audio and HD15 male to HD15 female connectors, 6-foot length.
9. Control cable for RS-232 communications applications with quantity of conductors as required by manufacturer's specifications for each controlled device.
10. Control cable for electric projection screen. Comply with screen and control system manufacturer's specifications.

11. High-performance HDMI cable, 22 AWG minimum, supports data rates up to 4.95 Gbps; HDMI 1.3 Category 2 compliant, pre-terminated with male connectors.
12. High-performance HDMI-to-DisplayPort crossover cable.
13. Pre-terminated VGA cable, 6-foot length.
14. Combination twisted-pair cable for Crestron Digital Media signal transmission:
 - a. Video data: Four twisted-pair, each pair isolated by an internal spline within an inner jacket, shield, braid and overall jacket.
 - b. Data management: Category 6A, four twisted-pair, 24 AWG solid copper conductors.
 - c. Power and control: One 22-AWG pair, one 18-AWG pair, with overall jacket.
 - d. Crestron Electronics, Incorporated DM-CBL-P or DM-CBL-NP.
15. Quiktron RapidRun Digital Runner cable. Length as required per distance between termination points.
16. Quiktron RapidRun Digital HDMI flying lead. Provide active flying lead for runs greater than 50-feet.
17. Quiktron RapidRun Digital DVI and 3.5-mm audio flying lead. Provide active flying lead for runs greater than 50-feet.
18. Quiktron RapidRun PC Runner cable. Length as required per distance between termination points.
19. Quiktron RapidRun HD15 and 3.5-mm audio flying lead.

2.15 ASSISTIVE LISTENING EQUIPMENT

- A. Manufacturers
 1. Listen Technologies
 2. Or approved equivalent.
- B. RF Wireless Assistive Listening System:
 1. 2-channel FM transmitter,
 2. Remote antenna.
 3. Three or Four wireless 3-channel FM receivers
 4. Assistive listening signage kit.

2.16 ARCHITECTURAL CONNECTIVITY

- A. Manufacturers:
 - 1. Connectors and Jacks:
 - a. Neutrik
 - b. Switchcraft
 - c. Liberty Wire & Cable
 - d. Or approved equivalent.
 - 2. Twisted-Pair/NDBASE-T:
 - a. Crestron
 - b. Or approved equivalent.
- B. Custom A-V Outlet Plates:
 - 1. Flush-mounted, stainless-steel faceplates.
 - 2. Jack/connector configuration as shown on Drawings.
 - 3. Size as shown on Drawings, to fit in industry standard back box unless specifically noted otherwise.
 - 4. Label jacks and connectors as indicated on Drawings, with 1/4-inch Arial-type font.
- C. Crestron Digital Media Wall Plates:
 - 1. Transmitter:
 - a. Two auto-switched inputs (HDMI and VGA with 3.5-mm stereo audio).
 - b. Transmits audio-video signals over Crestron Digital Media cable.
 - c. USB port which supports USB HID class devices.
 - d. Fits in standard double-gang box with double-gang decora type faceplate.
 - 2. Receiver:
 - a. One HDMI jack on single-gang decora type faceplate.
 - b. Receives audio-video signals over Crestron Digital Media cable.
 - c. HDCP content protection support.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Approvals and Substitutions:
 - 1. Provide products as specified without exception, unless approved in writing prior to bidding.
 - 2. Remove and replace non-compliant products installed as part of this Contract. Contractor to bear costs associated with removal and replacement of products
- B. Examine areas and conditions under which audio-video equipment will be installed. Notify Professional of conditions that would adversely affect installation or subsequent use. Do not begin installation until unacceptable conditions are corrected.
- C. Install complete system in strict accordance with manufacturer's recommendations. Complete all electrical connections to all system components.
- D. Install wiring in raceways where routed through inaccessible areas. Use J-hooks for cable installed in areas with accessible ceilings.
- E. Install equipment so it is held firmly in place. This includes racks, rack equipment, loudspeakers, control equipment, conduit, etc.
- F. Label switches, jacks, outlets, etc. in a logical and readable manner. Labels are to correspond with connection designations on shop drawings.
- G. Do not install electronic equipment in any space until other work within the space has been completed, to prevent dust, dirt, debris, etc. from damaging equipment.
- H. Mount modules for modular equipment in strict accordance with manufacturer's specifications.
- I. Store loose devices and cables in rack-mounted drawers, cabinets, or Department-approved location. Notify Department of location of loose devices and cables during training.
- J. Performance Requirements:
 - 1. Coordinate with Division 26, Electrical for installation of electrical service, raceways, conduit, back boxes and the like, necessary to support the systems specified.
 - a. Conceal wiring in walls and ceiling spaces during construction.
 - b. Determine requirements for plenum-rated cable. When doubt exists, seek determination in writing by AHJ prior to ordering.
- K. System Programming:

1. Programming of the control systems and user interfaces is the responsibility of the A-V Contractor. Program the user interface using manufacturer supplied configuration software and templates.
2. Program the control system and user-interface to provide novice-level functionality with features including, but not limited to, the following:
 - a. Display power on/off.
 - b. Source selection of audio and video devices.
 - c. Volume control of all audio sources.
 - d. Power on/off and source selection of video displays.
 - e. Display system and device status.
 - f. Control of dimmable lighting zones.
 - g. Control of projection screens and motorized shades.

L. Inspection and Testing Upon Completion:

1. Adjust audio system gain structure for optimum signal-to-noise ratio so that full amplifier output will be achieved with 0 dBm at line-level input.
2. Verify that projectors are adjusted such that the projected image fills the projection screen at the center of its zoom range.
3. Warranty materials and installation to be free of defects in material and workmanship after final acceptance of installation and test per Division 01, General Requirements.
4. Upon completion of the installation, furnish copies of complete operational instructions, complete with record drawings. Include part numbers and names, addresses and telephone numbers of parts source. One hard copy and two digital copies on CD required for materials.
5. Nothing contained in this Section to be construed to relieve the Contractor from furnishing a complete and acceptable system in all its categories. The Professional will reject any materials or labor that are or may become detrimental to the accomplishment of the intents of these Specifications.

M. Training:

1. Provide Department with manufacturer's operating instructions.
2. Provide representatives to instruct the Department's personnel in the operation of each system, its components and equipment.

3. Demonstrate to the Department all system features and operations.
 4. Provide comprehensive training for the Department's Authorized Representative for the operation, maintenance and troubleshooting of the systems. Provide two copies of configuration data file for control systems and touch-panel user interfaces on CD.
- N. Clean-Up:
1. Remove unused materials and debris from the work and storage areas. Leave areas in an undamaged and acceptable condition.
 2. Save the shipping boxes for the Department in case of need to return product for service.

3.2 EQUIPMENT MOUNTING HARDWARE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Equipment Racks:
1. Fasten free-standing equipment racks to the floor using a minimum of four 3/8-inch concrete anchors. In raised floor areas, secure equipment racks to the concrete floor below.
 2. Position free-standing equipment racks according to the Drawings with a minimum of 3-feet clearance in front. Report any discrepancies to the Professional.
 3. Mount equipment within rack as shown in rack elevations on Drawings.
 4. Fill unused rack space with blank rack panels.
- D. Video Display Mounting Hardware:
1. Position projector mounting hardware according to the Drawings, fastened to structure.
 2. Size extension columns such that the projector lens aligns to the top of the projection screen.
 3. Coordinate backing requirements for flat-panel display mounting hardware with Professional prior to rough-in.

3.3 POWER DISTRIBUTION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

- C. Mount power distribution in rack as shown in rack elevations on Drawings.
- D. Connect equipment cords from rack-mounted equipment to the power distribution unit.

3.4 AUDIO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.5 AUDIO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.6 AUDIO AMPLIFICATION

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install amplifiers that will supply sufficient power to speakers without exceeding 70% of the amplifier's maximum rated output power
- D. Audio Signal Routing: Furnish and install required signal routing mixers, equalizers, or processors so the User can produce and route an audio signal to any location or equipment within the system.
- E. Speakers: Furnish and install flush mounted ceiling speakers of professional commercial grade. Locate speakers as noted on drawings.

3.7 LOUDSPEAKERS

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.8 VIDEO SOURCE EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.9 VIDEO DISTRIBUTION EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.10 VIDEO DISPLAY EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.11 CONTROL SYSTEM EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

3.12 WIRE AND CABLE

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Provide system wiring in accordance with good engineering practices as established by Telecommunications Industry Association (TIA), and NEC. Meet all established Commonwealth and local electrical codes.
- D. Isolate cabling within rack by signal type. Maintain at least 4-inch separation from electrical power cables.
- E. Dress cables in rack in a neat and workmanlike manner with velcro ties, cables bundled by signal type.
- F. Label cables using a machine printed label, at each end of the cable within 12-inches of the termination point. Handwritten labels are not permitted. Labels to correspond with cable designations on shop drawings.

3.13 ASSISTIVE LISTENING EQUIPMENT

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.
- C. Furnish and install an assistive listening system located as indicated on the drawings.
- D. Ensure User signal is clearly receivable at any point within the room where the transmitter is located.
- E. Provide the minimum number of assistive listening user headsets or neck loops required by Code.

3.14 ARCHITECTURAL CONNECTIVITY

- A. See General Installation Requirements above.
- B. Install per manufacturer's instructions and recommendations.

C. Input Plates:

1. Furnish and install user equipment input plates in the locations indicated and per the details shown on the drawings.
2. Furnish and install active input plates where cabling exceeds the maximum distance limitations for signal transmission.
3. Input plates are to have, at a minimum, a VGA and audio input into the A/V system.

END OF SECTION 274116.62

MARQUEE BUILDING

		Room #			
Equipment	Auditorium				
Projector	Panasonic PT-RZ990BU with standard lens				
Monitor	NA				
Audio Reinforcement Speakers	JBL Control 26CT				
Wireless Microphone System	Shure SLXD124/85				
Wired Microphones	NA				
Control Panel	Crestron TSW-770				
AV Cabinet	Middle Atlantic ERK-4425-AV				
Power Supply	Furman P-8 PRO C				
Control	Crestron CP-4N				
Video Matrix	Crestron DM-MD6X4				
DSP	Biamp Tesira I/O				
POE Switch	Crestron CEN-SWPOE-16				
Amplifier	QSC ISA800Ti				
Assisted Listen System	Listen Tech LCS-120-01				
Floor Box AV inputs	Crestron DM-TX-200-C-2G				
Wall AV inputs	NA				

TECHNOLOGY SYMBOL LIST

Abbreviations

AFF	ABOVE FINISHED FLOOR
ALS	ASSISTED LISTENING SYSTEM
AV	AUDIO VISUAL
COAX	COAXIAL
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CFOI	CONTRACTOR FURNISHED OWNER INSTALLED
ER	EQUIPMENT ROOM
LC	FIBER OPTIC CONNECTOR
SC	FIBER OPTIC CONNECTOR
FDU	FIBER OPTIC DISTRIBUTION UNIT
FT	FOOT, FEET
HH	HANDHOLE
IN	INCH, INCHES
ICT	INFORMATION AND COMMUNICATIONS TECHNOLOGY
IT	INFORMATION TECHNOLOGY
ISP	INSIDE PLANT
LAN	LOCAL AREA NETWORK
LV	LOW VOLTAGE
MTR	MAIN TELECOMMUNICATIONS ROOM
MH	MAINTENANCE HOLE
MATV	MASTER ANTENNA TELEVISION
NTS	NOT TO SCALE
OSP	OUTSIDE PLANT
CFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
CFOI	OWNER FURNISHED, OWNER INSTALLED
PTZ	PAN, TILT, ZOOM
PBB	PRIMARY BUSBAR
QTY	QUANTITY
RU	RACK UNIT
SATV	SATELLITE ANTENNA TELEVISION
SBC	SECONDARY BONDING CONDUCTOR
SBB	SECONDARY BUSBAR
TR	TELECOMMUNICATIONS ROOM
TYP	TYPICAL
UPS	UNINTERRUPTIBLE POWER SUPPLY
UON	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF
WAN	WIDE AREA NETWORK
WAP	WIRELESS ACCESS POINT
WIFI	WIRELESS FIDELITY

Equipment

	PRIMARY BUSBAR (PBB) 4" X 20" X .25"
	SECONDARY BUSBAR (SBB) 4" X 12" X .25"
	2-POST OPEN-RELAY/EQUIPMENT RACK
	3/4\"/>
	DOUBLE-SIDED VERTICAL WIRE MANAGEMENT
	FLOOR MOUNT CABINET
	WALL MOUNT CABINET
	WALL MOUNT RACK

Pathways

	CABLE RUNWAY, WIDTH AS INDICATED
	CONDUIT DOWN
	CONDUIT SLEEVE
	CONDUIT UP
	CONDUIT WIRING CONTINUATION
	J-HOOKS
	WIRE BASKET TYPE CABLE TRAY, WIDTH AS INDICATED
	4\"/>

Reference Symbols

	DETAIL NUMBER AND SHEET LOCATION
	KEYED NOTES

Telecommunications

SECTION NUMBER AND SHEET LOCATION

	AUDIO VISUAL COMMUNICATIONS OUTLET WITH TWO, CATEGORY 6A CABLES. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	CEILING MOUNTED WIRELESS ACCESS POINT WITH FOUR, CAT6A CABLES (BESO BUILDING ONLY)
	CEILING MOUNTED WIRELESS ACCESS POINT WITH TWO, CAT6A CABLES (BESO BUILDING ONLY)
	COMMUNICATIONS OUTLET WITH SS BOX AND FOUR, CATEGORY 6A CABLES. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	SECURITY COMMUNICATIONS OUTLET WITH ONE, CATEGORY 6A CABLE. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	WALL MOUNT AREA OF REFUGE PHONE OUTLET WITH ONE, CATEGORY 6A CABLE. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	WALL MOUNT WIRELESS NETWORK DIGITAL CLOCK. PROVIDE WALL MOUNTED CLOCK TO A 4S BOX PROVIDED WITH 120V POWER.
	WALL MOUNTED WIRELESS COMMUNICATIONS OUTLET WITH TWO, CATEGORY 6A CABLES. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	CEILING MOUNTED, WIRELESS ACCESS POINT WITH TWO, CATEGORY 6A CABLES. PROVIDE SS BOX WITH SINGLE GANG ADAPTER RING AND 1.25\"/>
	WIRELESS ACCESS POINT IN RASIED FLOOR, PROVIDE FOUR, CAT6A CABLES IN AN ADJACENT SS BOX MOUNTED TO CONCRETE SLAB WITHIN 50\"/>

TELECOMMUNICATIONS GENERAL NOTES

- A. THE TELECOMMUNICATIONS CONTRACTOR RESPONSIBLE FOR ALL OF THE WORK DESCRIBED IN THESE CONTRACT DRAWINGS AND SPECIFICATIONS SHALL BE REFERRED TO THROUGHOUT THESE DOCUMENTS AS THE "CONTRACTOR".
- B. THE CONTRACTOR SHALL ADHERE TO ALL BUILDING RULES AND REGULATIONS.
- C. THESE COMMUNICATIONS DRAWINGS ARE TO BE USED IN CONJUNCTION WITH THE COMMUNICATIONS SPECIFICATIONS DOCUMENT, SHOULD THERE BE ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE SPECIFICATIONS, THE CONTRACTOR SHALL BRING IT TO THE IMMEDIATE ATTENTION OF THE CONSTRUCTION MANAGER.
- D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING ANY DISCREPANCIES BETWEEN THESE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS, ANY DISCREPANCIES ARE TO BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE CONSTRUCTION MANAGER.
- E. ALL CONDUITS AND SLEEVES DESIGNATED FOR COMMUNICATIONS USE, WHETHER THEY ARE UTILIZED BY THE CONTRACTOR OR NOT, SHALL BE FIRE STOPPED.
- F. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHER TRADES AND DRAWINGS. FURTHERMORE, THE CONTRACTOR SHALL COORDINATE THE SEQUENCE OF WORK WITH THE CONSTRUCTION MANAGER.
- G. BACKBOXES, CONDUITS, STUB-UPS SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.
- H. CABLE TRAY AND CABLE RUNWAY SHALL BE PROVIDED BY THE DIV.27 CONTRACTOR.
- I. THE ENTIRE CABLE PLANT SHALL BE TESTED AS OUTLINED IN THE SPECIFICATIONS.
- J. REFER TO THE SPECIFICATIONS FOR ADDITIONAL ABBREVIATIONS AND ACRONYMS.
- K. THE CONTRACTOR SHALL PROVIDE ALL CABLE, HARDWARE AND EQUIPMENT SHOWN ON THESE DRAWINGS EXCEPT WHERE OTHERWISE NOTED.
- L. THE CONTRACT DRAWINGS OF ALL TRADES INCLUDING ARCHITECTURAL, STRUCTURAL, HVAC, ELECTRICAL, PLUMBING, FIRE PROTECTION, IT, AV, SECURITY ETC. ARE PART OF THIS PACKAGE. THE TELECOMMUNICATIONS CONTRACTOR MUST REVIEW THE DRAWINGS OF ALL OTHER TRADES AND OBTAIN PERTINENT INFORMATION THAT PERTAINS TO THE TELECOM WORK AND IS SHOWN OR INDICATED ON OTHER TRADE DRAWINGS. NO EXTRAS WILL BE PERMITTED DUE TO THE FAILURE OF THE CONTRACTOR TO COMPLY WITH THIS REQUIREMENT. AFTER REVIEW OF ALL DOCUMENTS IF THE CONTRACTOR FEELS SOMETHING IS NOT IN THEIR SCOPE OF WORK, CONTRACTOR MUST TAKE EXCEPTION DURING BID SUBMISSION AND CLEARLY INDICATE THE SCOPE OF WORK FOR WHICH CONTRACTOR IS TAKING THE EXCEPTION.
- M. THE CONTRACTOR MUST MAINTAIN A RUNNING UPDATE OF ALL FIELD OR CONTRACT DOCUMENT CHANGES AND UPDATE THEIR "AS BUILT" DRAWINGS AS AN ONGOING PROCESS.
- N. ALL EQUIPMENT, CABLING, RACEWAY, ETC. SHALL BE GROUNDED IN ACCORDANCE WITH THE SPECIFICATIONS. PROVIDE GROUND CONDUCTORS, GROUND CLAMPS, COMPRESSION TAPS, LUGS, ETC. AS REQUIRED FOR CONNECTION TO THE TELECOMMUNICATIONS GROUNDING AND BONDING SYSTEM (AS REQUIRED). TELECOMMUNICATIONS GROUNDING AND BONDING SYSTEM SHALL BE PROVIDED BY DIVISION 26, INCLUDING BUT NOT LIMITED TO: BONDING CONDUCTOR FOR TELECOMMUNICATIONS, TELECOMMUNICATIONS GROUNDING BUSBAR, TELECOMMUNICATIONS BONDING BACKBONE, TELECOMMUNICATIONS GROUNDING BUSBARS, GROUNDING EQUALIZER AND BONDING CONDUCTORS TO BUILDING STEEL (WHERE APPLICABLE), POWER PANELS (WHERE APPLICABLE) AND CONDUITS.
- O. CONTRACTOR TO COORDINATE WITH AUDIO VISUAL, SECURITY DRAWINGS, CIVIL AND SITE PLANS FOR CABLING DISTRIBUTION ON THE PROJECT SITE AND OTHER ELEMENTS.
- P. USE PULLBOXES WHEREVER THE BENDS IN A CONDUIT RUN EXCEED 180-DEGREES.
- Q. TELECOMMUNICATION CONTRACTOR SHALL COMPLY WITH ZONE 4 SEISMIC REQUIREMENTS FOR ALL EQUIPMENT RACKS, CABLE TRAYS, AND ANY OTHER EQUIPMENT THAT REQUIRES BRACING OR STRUCTURAL SUPPORT. COORDINATE WITH STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT.
- R. COORDINATE WITH BMS CONTRACTOR FOR DATA REQUIREMENTS ON ROOF OR MECHANICAL ROOMS. DATA LOCATIONS, IF ANY, ARE TO RUN BACK TO THE NEAREST TELECOM ROOM AS SHOWN ON THE ZONES ON THE TELECOM FLOOR PLANS.
- S. UNLESS OTHERWISE NOTED, ALL CONDUIT SHALL BE 1.25" ELECTROMETALLIC TUBING (EMT) AND RUN WITHIN WALLS.
- T. ALL NETWORK CABLING IS CATEGORY 6A, CMP.
- U. TELECOM VAULTS ARE IDENTIFIED ON THIS DRAWING WITH THE LETTER DESIGNATOR T, FOLLOWED BY TWO NUMERICAL DIGITS, THAT ARE UNIQUE TO EACH VAULT.
- V. EXISTING ISP VAULTS ARE APPROXIMATE LOCATIONS AND NEED TO BE COORDINATED WITH CIVIL DRAWINGS, INTERNET SERVICE PROVIDERS, GENERAL CONTRACTOR AND OWNER.
- W. ALL EXISTING NETWORKS SHALL REMAIN OPERATIONAL FOR THE REMAINDER OF THE CAMPUS THAT IS AND IS NOT WITHIN THE BOUNDARY SCOPE OF THE PROJECT. CONTRACTOR SHALL IDENTIFY AND WORK WITH CIVIL, GENERAL CONTRACTOR AN OWNER TO SAFEGUARD ALL COMMUNICATIONS CABLES AND CIRCUITS. BUILDINGS AND SERVICES UPSTREAM OR DOWNSTREAM MUST BE CAREFUL OBSERVED AND SAFEGUARDED IN PLACE.
- X. ALL DEVICE LOCATIONS SHALL BE COORDINATED WITH ARCHITECT AND OWNER FOR FINAL ELEVATIONS AND FINAL FINISH SELECTIONS.
- Y. DIGITAL CLOCKS REQUIRE 120V POWER IN A 4S BOX. THE DIGITAL CLOCK WILL SURFACE MOUNT TO THE 4S BOX. DIVISION 27 CLOCK INSTALL SHALL COORDINATE THE POWER CONNECTION WITH THE DIVISION 26 (ELECTRICAL CONTRACTOR).
- Z. FOR DEVICES LOCATIONS IN CMU WALLS, CONDUITS AND BACK BOXES SHALL BE IN WALL AND FINISH FLUSH FOR DEVICE TO MOUNT TO.
- AA. CONDUITS SHALL BE ENCASED IN CONCRETE WHEN GOING UNDER BUILDING FOUNDATIONS.
- BB. ALL VAULTS AND LIDS/COVERS SHALL BE HEAVY TRAFFIC RATED. CONTRACTOR SHALL COORDINATE WITH CIVIL AND INTERNET SERVICE PROVIDERS.
- CC. MTR'S AND TR'S, THAT HAVE CMU WALLS, THE WALLS SHALL BE GROUDED WITH CONCRETE TO ANCHOR PLYWOOD AND EQUIPMENT ON WALLS.
- DD. FOR ENGINEERED BUILDINGS PLYWOOD AND EQUIPMENT SHALL MOUNT USING UNISTRUT SUPPORTS TO ACHIEVE THE WEIGHT RATINGS. COORDINATE WITH GENERAL CONTRACTOR AND BUILDING MANUFACTURER FOR ANCHORAGE REQUIREMENTS.
- EE. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL PHASING FOR A COHESIVE PROJECT DELIVERY. IRRESPECTIVE OF WHICH PHASE SCOPE IS CALLED OUT FOR, THIS IS ONE OVERARCHING PROJECT AND THE CONTRACTOR IS EXPECTED TO REVIEW ALL PHASE BID PACKAGES AND TO INQUIRE WITH THE OWNER AND ARCHITECT DESIGN TEAM FOR ANY CLARIFICATIONS, RFIs, AND DISCREPANCIES.

MAXIMUM CONDUIT SIZE	BOX SIZE WIDTH	BOX SIZE LENGTH	BOX SIZE DEPTH	ADD LENGTH TO BOX SIZE FOR EACH ADDITIONAL CONDUIT
1.5"	8"	24"	4"	4"
2"	8"	32"	4"	5"
4"	15"	64"	8"	8"

* FOR ISP, PULL BOXES SHOULD BE PLACED EVERY 100 FEET. THERE SHALL BE NO MORE THAN 180-DEGREES OF BENDS BETWEEN ACCESSIBLE PULL POINTS.
* FOR OSP, PULL BOXES SHOULD BE PLACED EVERY 300 FEET. THERE SHALL BE NO MORE THAN 180-DEGREES OF BENDS BETWEEN ACCESSIBLE PULL POINTS.

INTERNAL DIAMETER	MINIMUM BEND RADIUS
2" OR LESS	6 TIMES THE INTERNAL CONDUIT DIAMETER
2.5" OR MORE	10 TIMES THE INTERNAL CONDUIT DIAMETER

CONDUIT TRADE SIZE	CONDUIT AREA (SQ IN)	40% FILL BASED ON DIAMETER OF CABLES
1.25"	1.5"	6
2"	3.36"	27
3"	7.39"	72
4"	12.73"	120

* INDUSTRY STANDARD AND NEC CODES IS TO DESIGN FOR A MAXIMUM OF 40% FILL. THE ACTUAL NUMBER OF CABLES WHICH CAN BE INSTALLED IN A PARTICULAR CONDUIT CAN BE SLIGHTLY MORE OR SIGNIFICANTLY LESS DEPENDING UPON FOLLOWING.

1. ALL CABLES MUST BE PULLED AT THE SAME TIME TO ACHIEVE THE GREATER FILL LEVELS.

SHEET INDEX

GEN	GEN-TC-001	SYMBOL LIST AND GENERAL NOTES - TELECOMMUNICATIONS
GEN	GEN-TC-700	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-701	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-702	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-703	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-704	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-705	DETAILS - TELECOMMUNICATIONS
GEN	GEN-TC-706	DETAILS - TELECOMMUNICATIONS

TACTICAL TRAINING DESIGN

Tactical Design North

231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT

Jacobs Wyper Architects

1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER

Skidmore, Owings & Merrill LLP

250 Greenwich St, New York, NY 10007

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

A & J Consulting Engineering Services, P.C.

164 Brighton Rd, Clifton, NJ 07012

MECHANICAL A/V/IT 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

VEHICAL TRANSPORT

Michael Blades & Associates Ltd.

5409 Rapiant Ct, Lothian, MD 20711

SINAGE 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

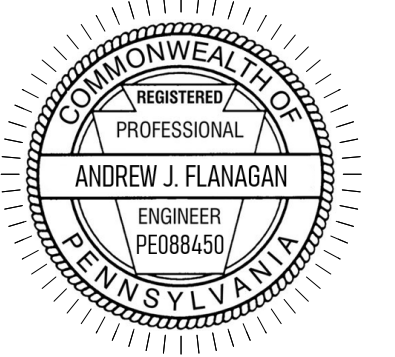
AECOM

1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO	DATE	DESCRIPTION	NO	DATE	DESCRIPTION
4	8 JUN 2023	ADDENDUM 25			

RECORD REVISIONS



AF
SIGNATURE
6/9/2023
DATE

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

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
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.

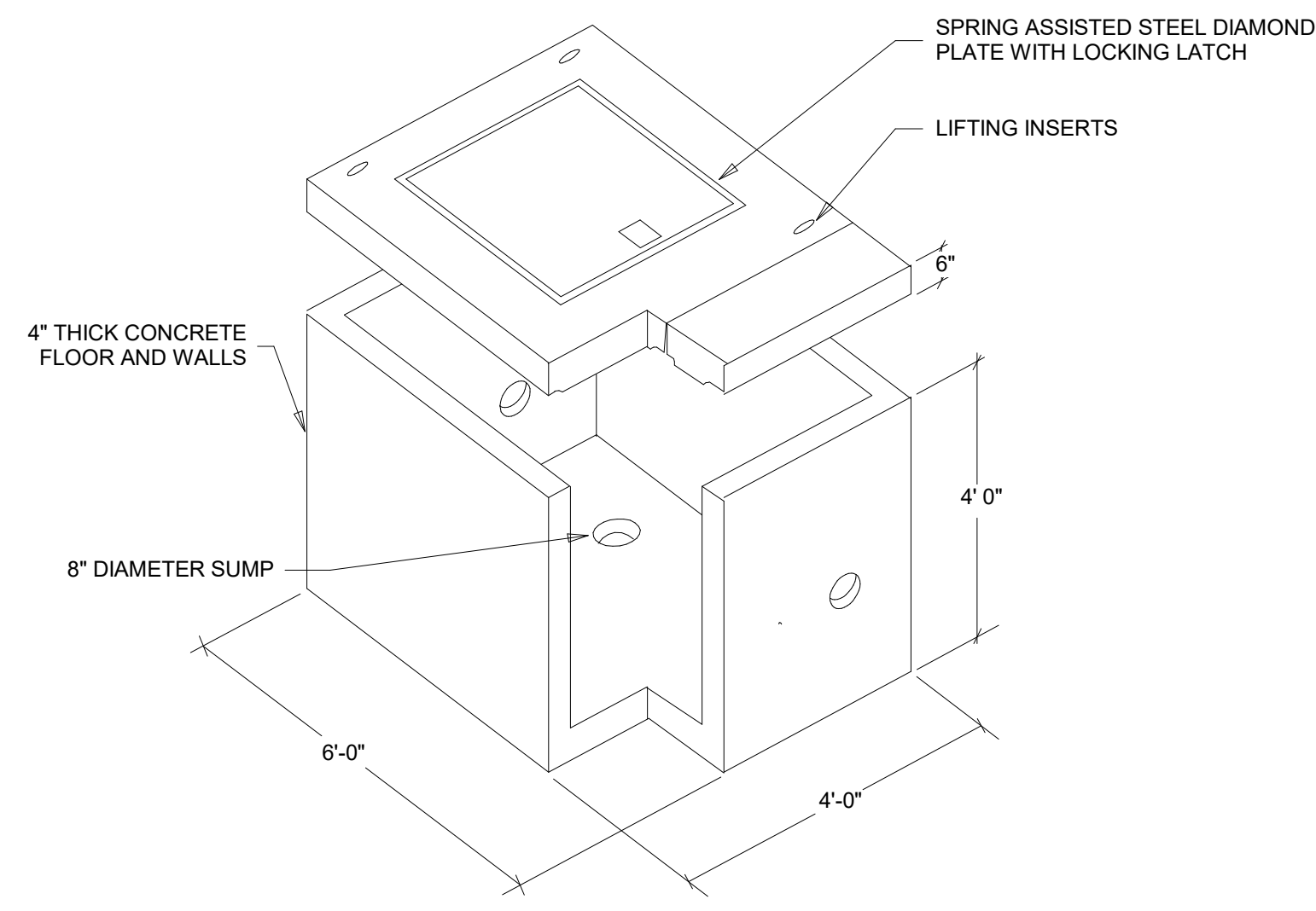
SYMBOL LIST AND GENERAL NOTES - TELECOMMUNICATIONS

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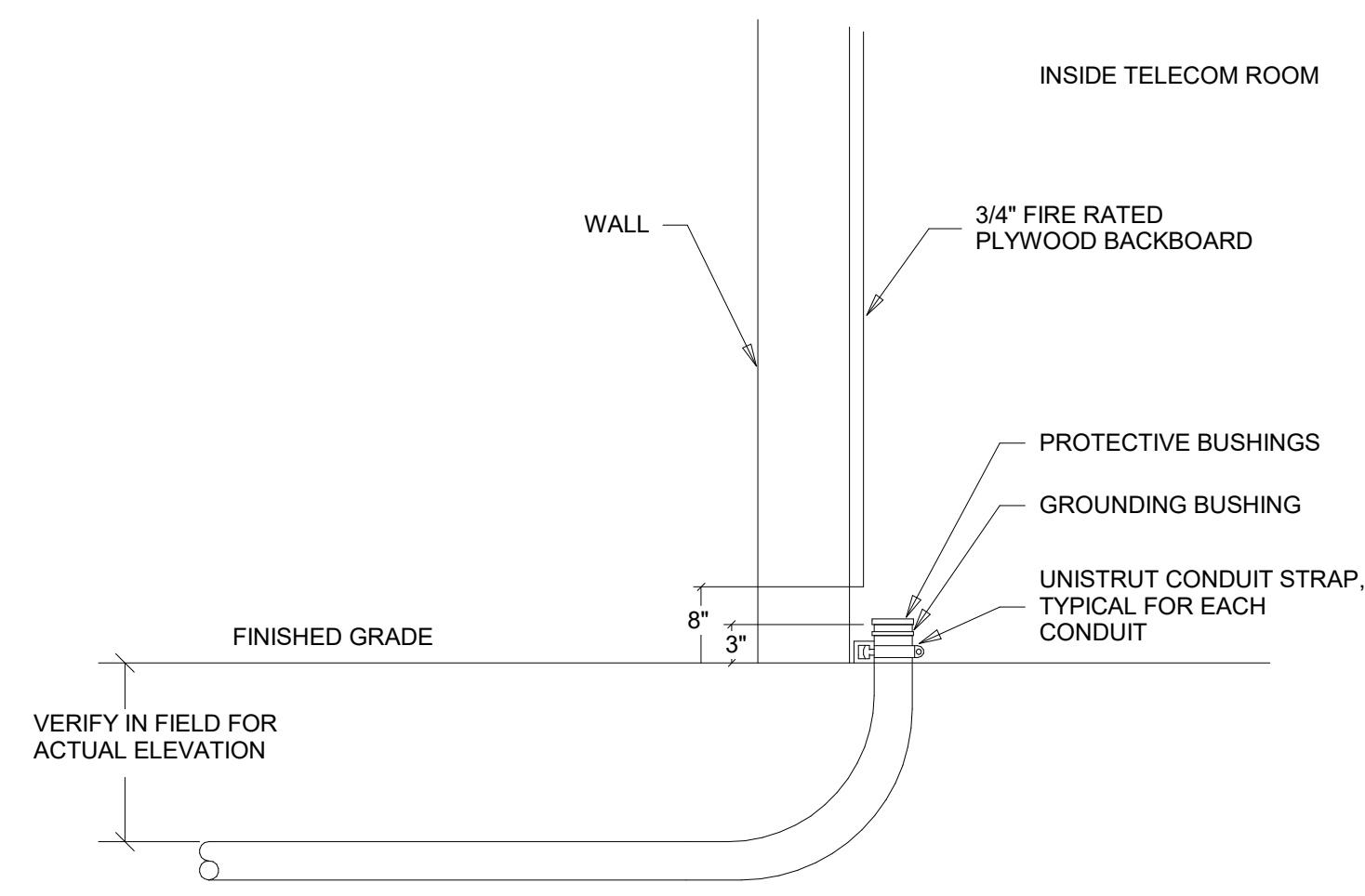
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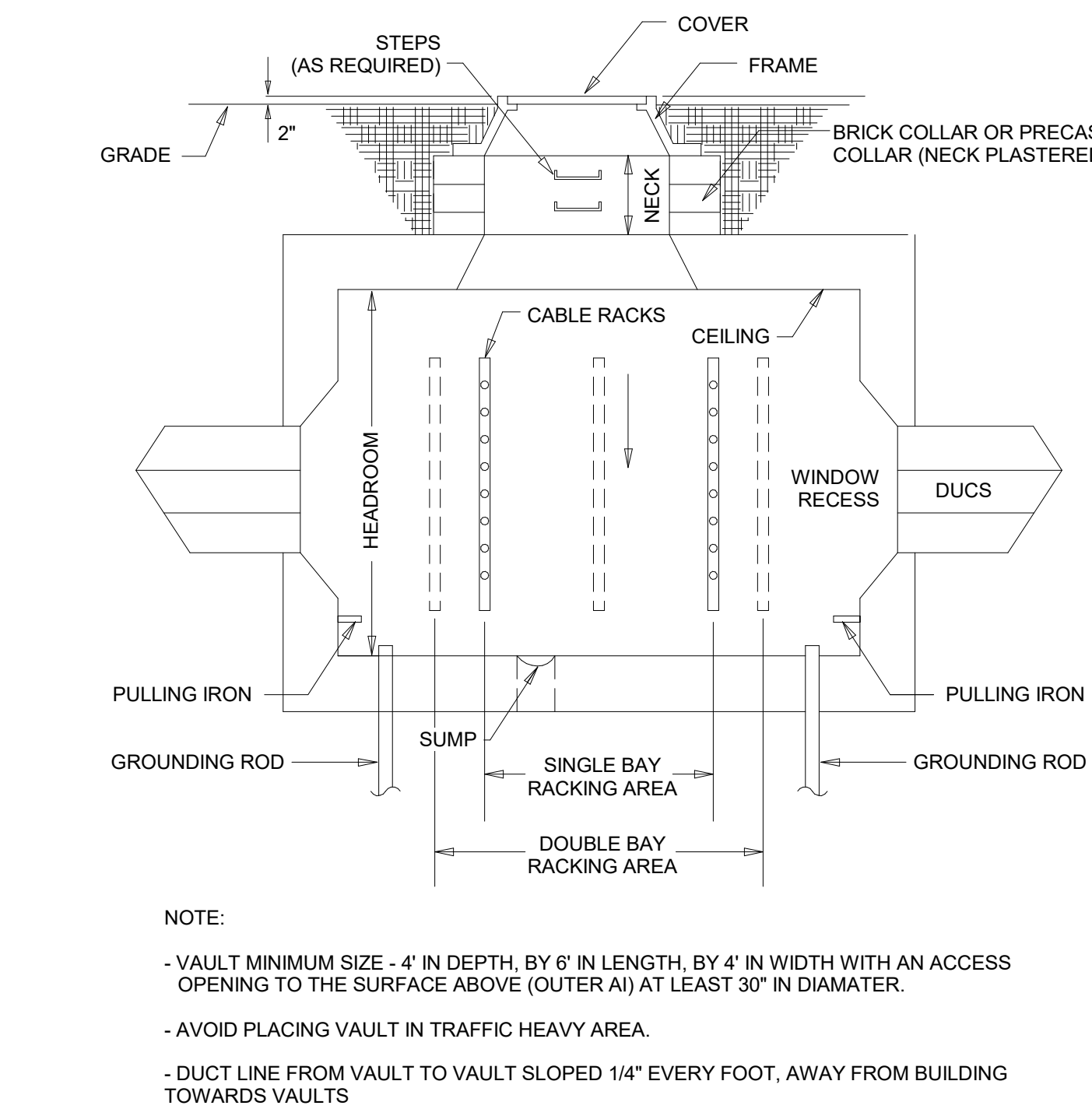
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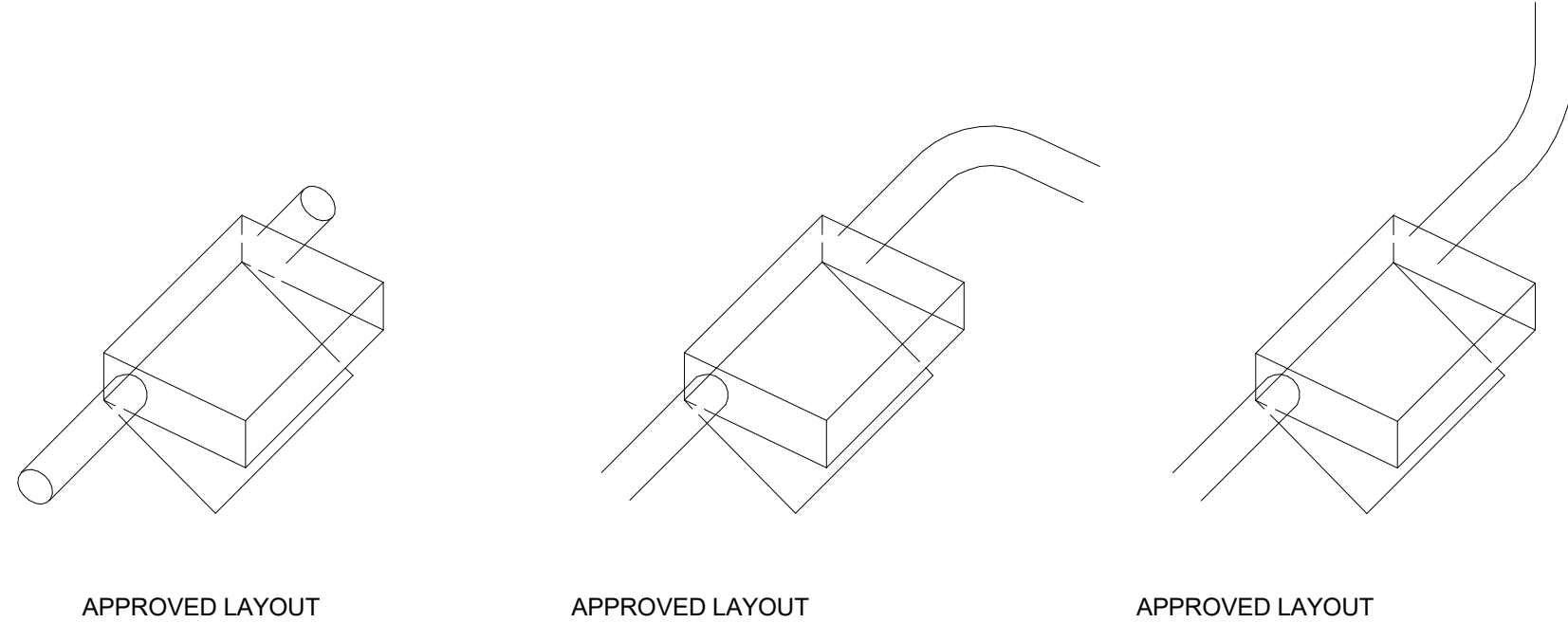
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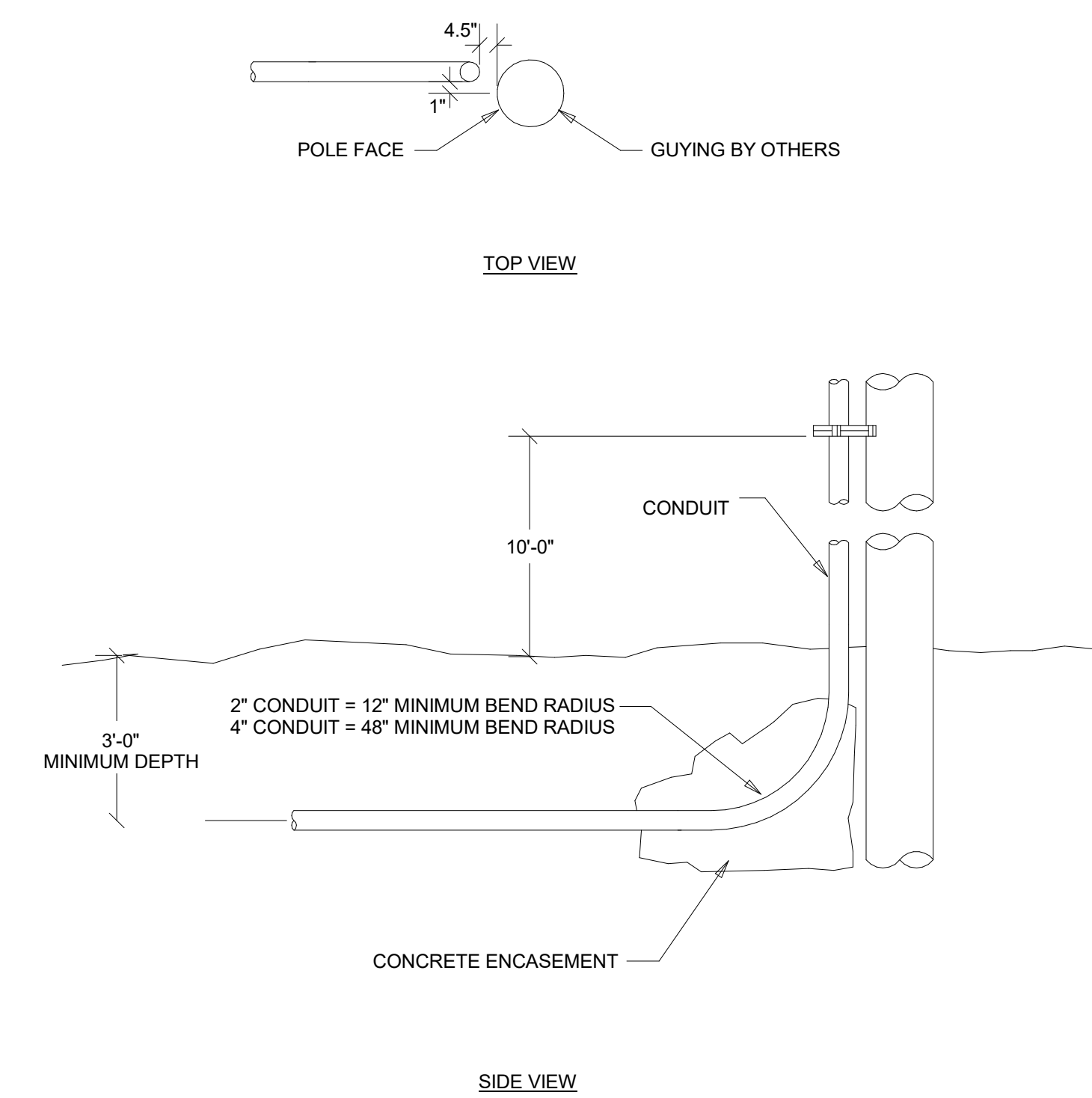
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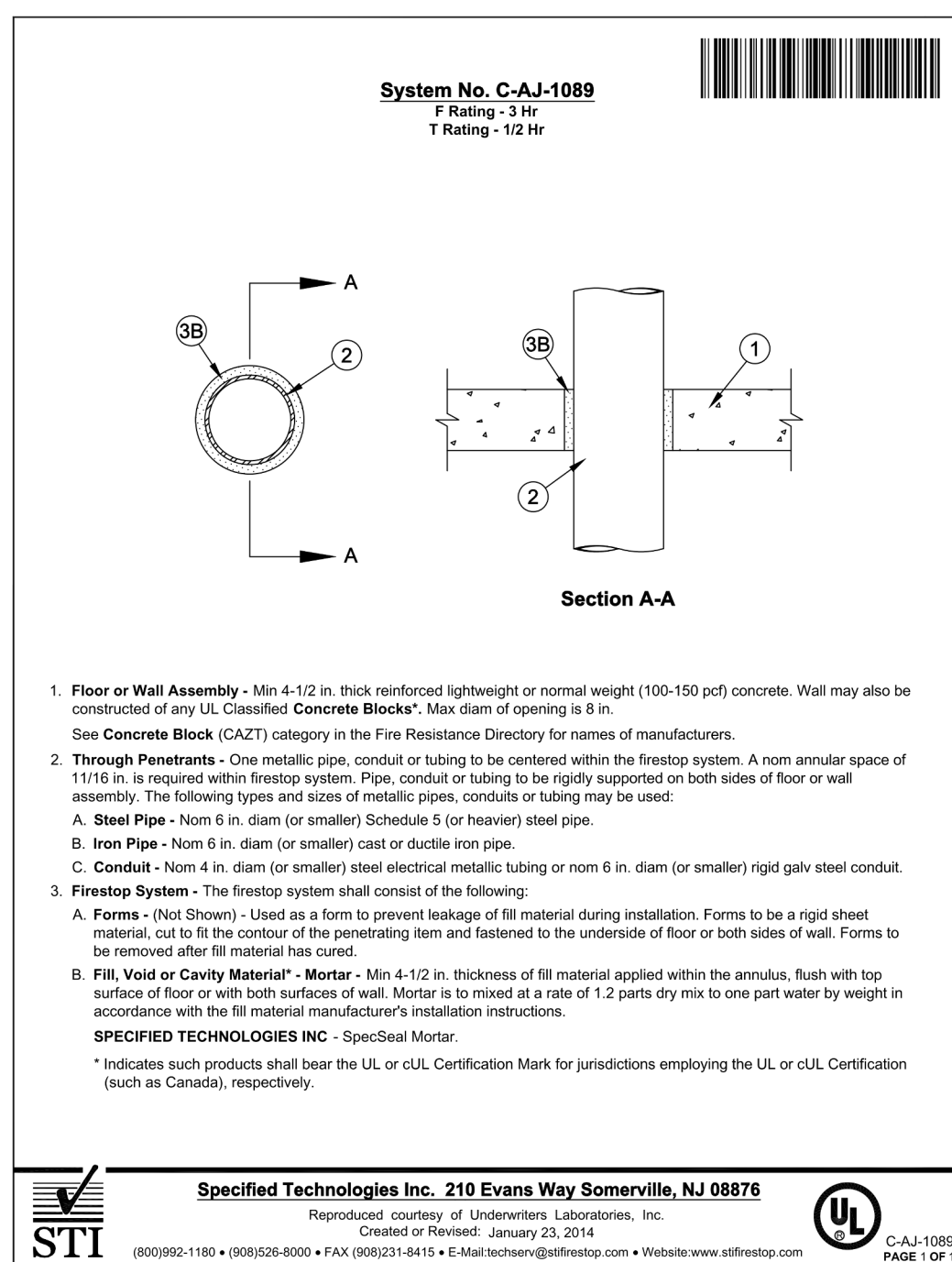
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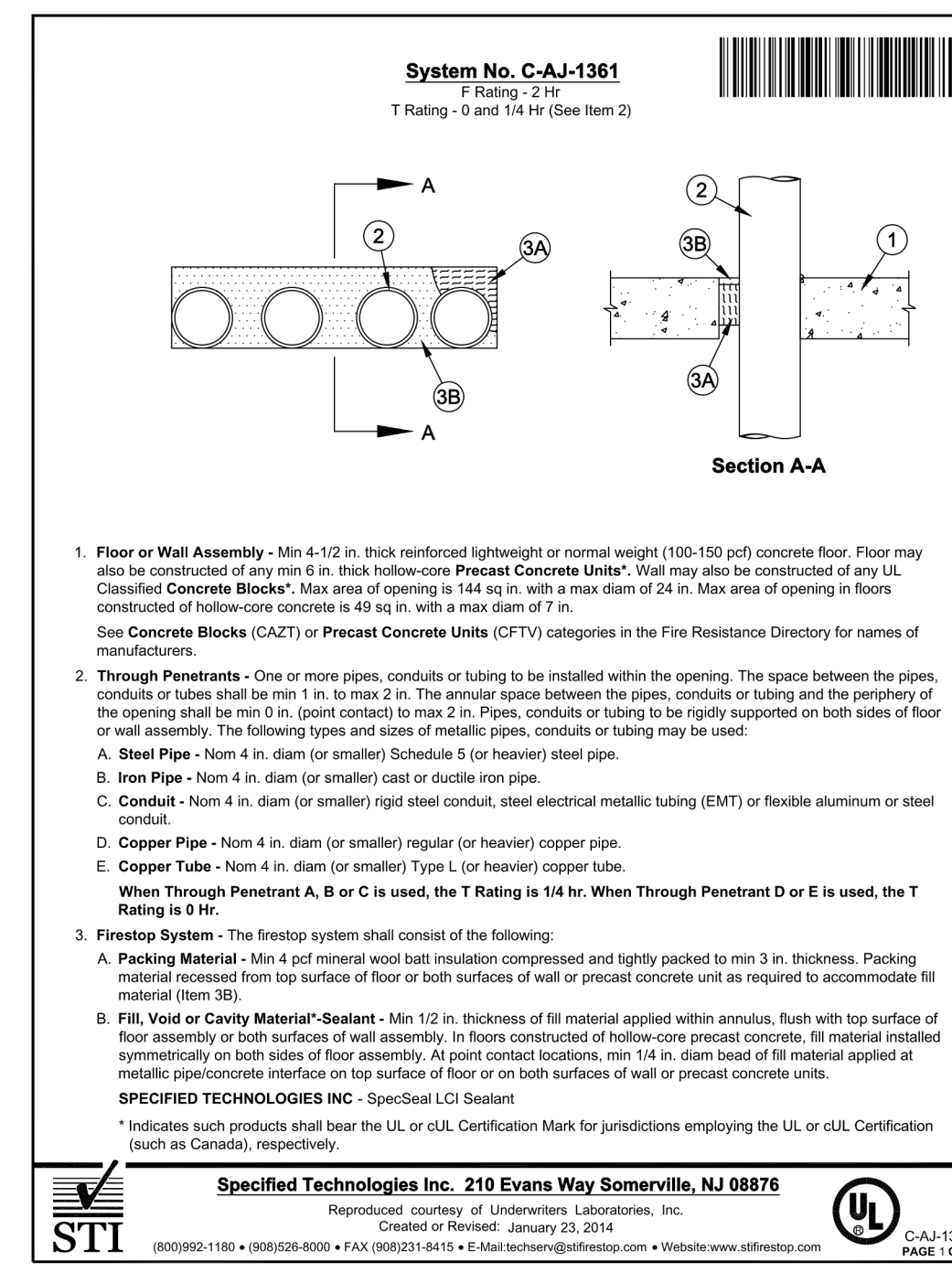
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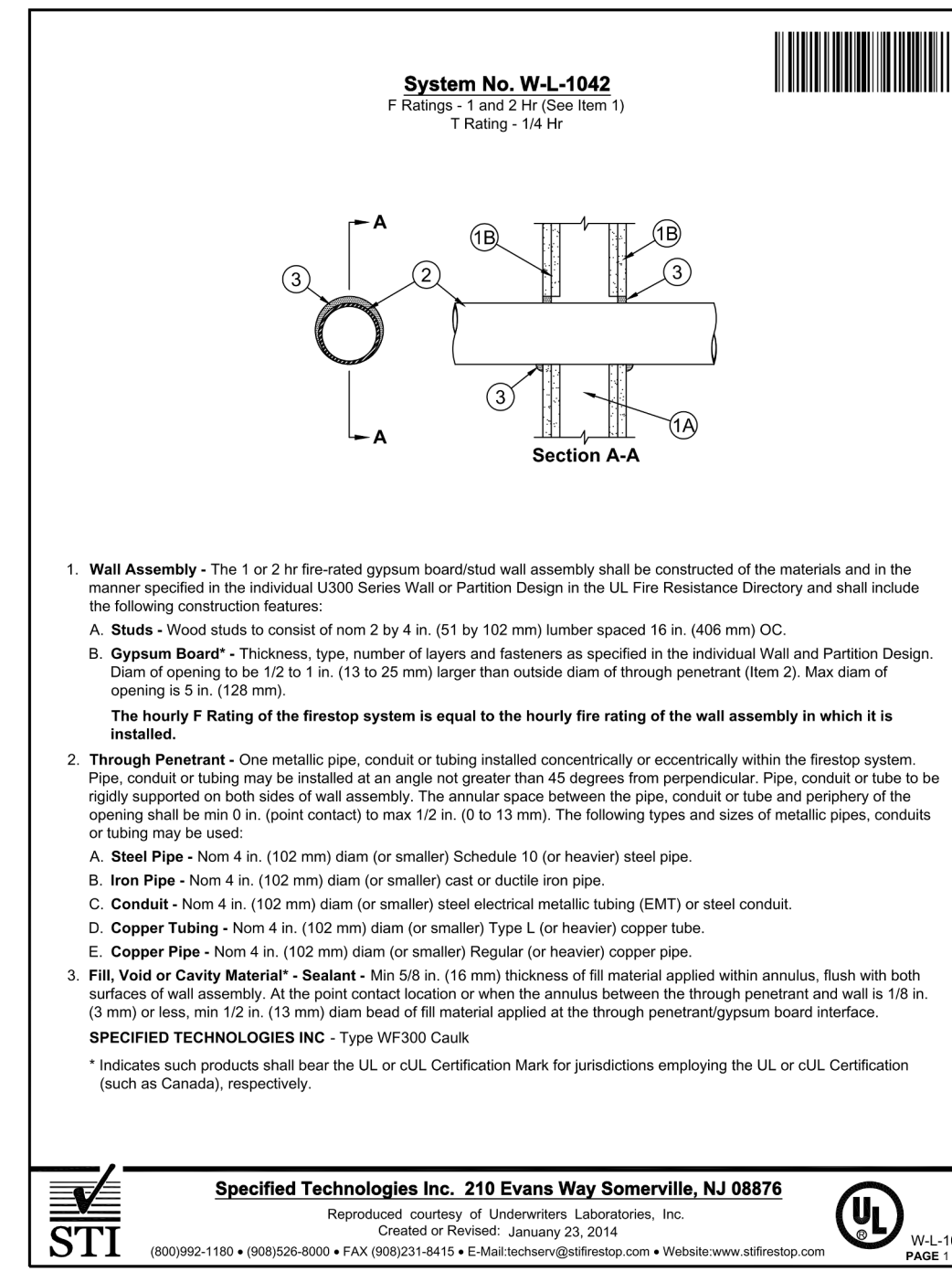
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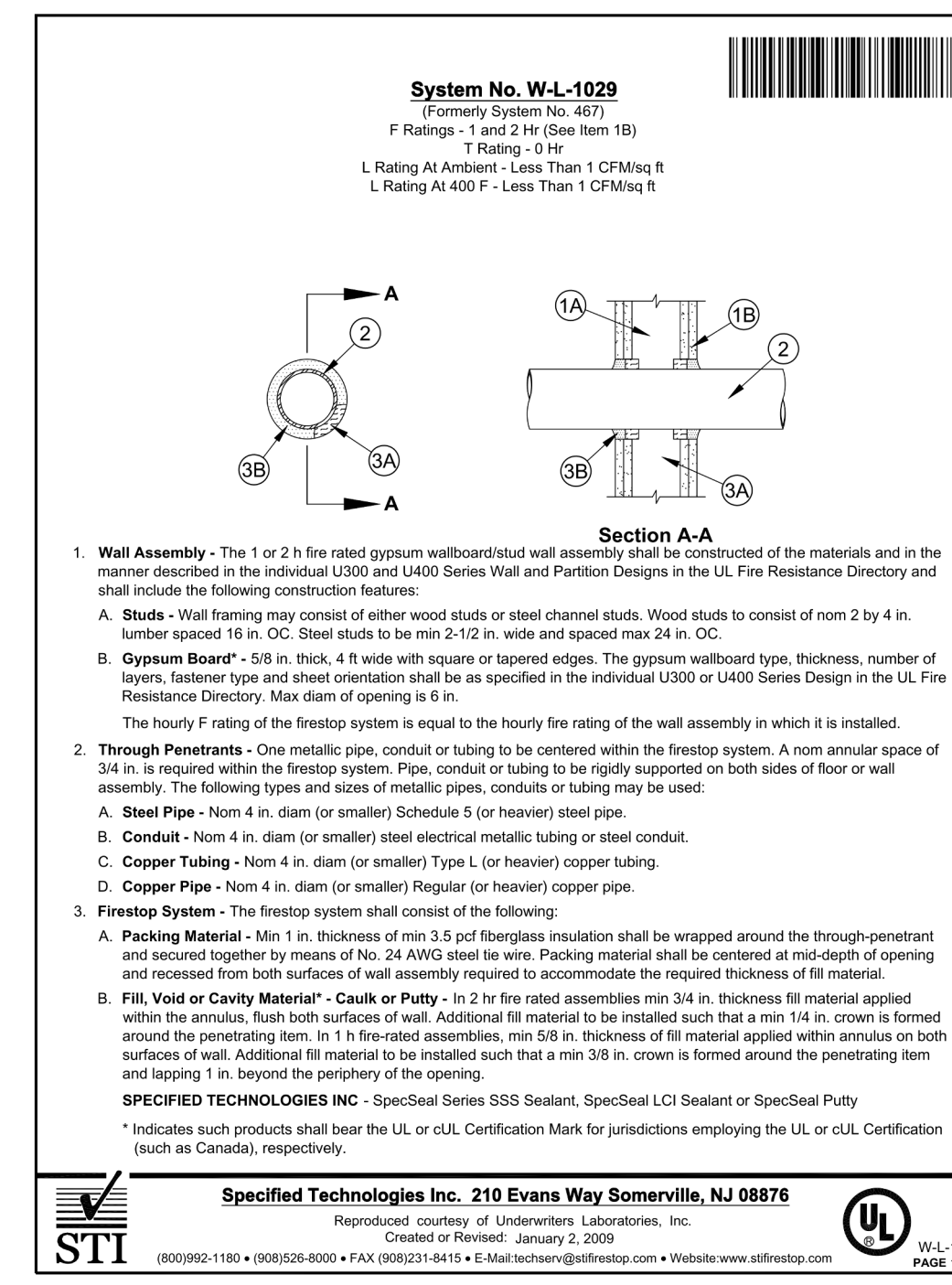
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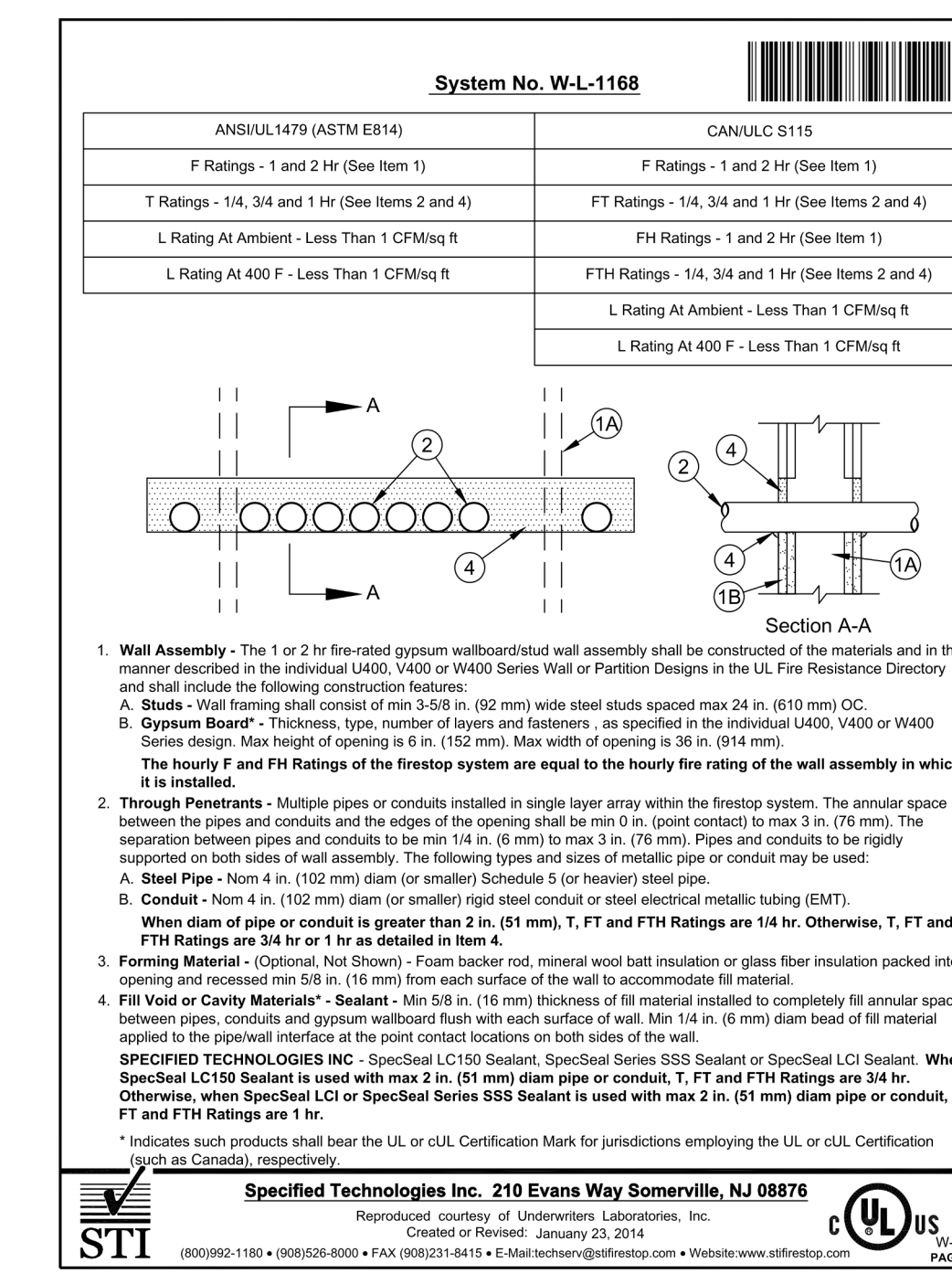
10 CONDUIT UL SYSTEM NO. W-L-1042

NO SCALE



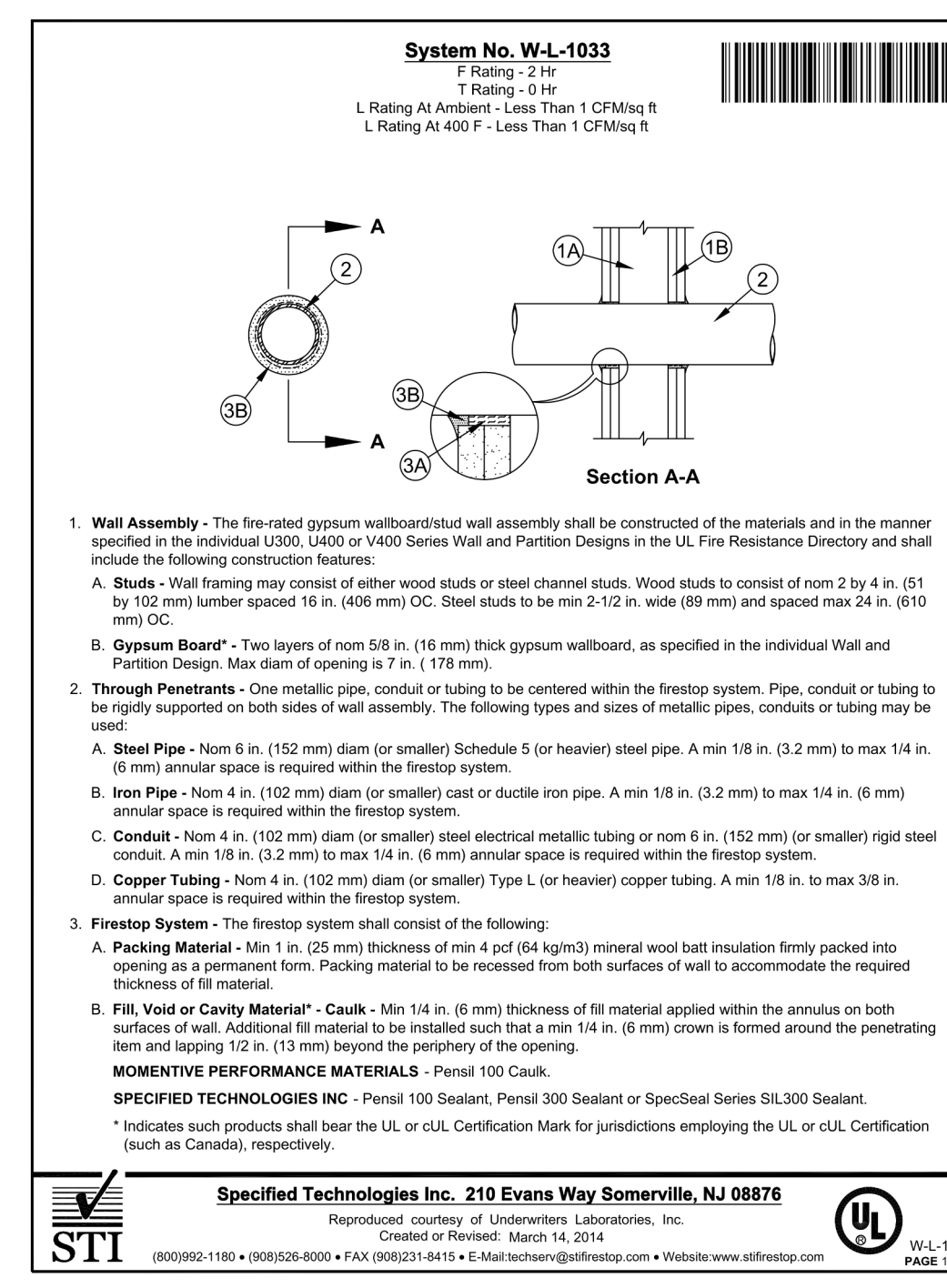
8 CONDUIT UL SYSTEM NO. W-L-1029

NO SCALE



11 CONDUIT UL SYSTEM NO. W-L-1168

NO SCALE



9 CONDUIT UL SYSTEM NO. W-L-1033

NO SCALE

TACTICAL TRAINING DESIGN

Tactical Design North

231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT

Jacobs Wyper Architects

1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER

Skidmore, Owings & Merrill LLP

250 Greenwich St, New York, NY 10007

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

A & J Consulting Engineering Services, P.C.

164 Brighton Rd, Clifton, NJ 07012

MECHANICAL, AVIATION ENGINEER

Interface Engineering, Inc.

2000 M Street NW, Suite 270, Washington, DC 20036

ACOUSTICAL ENGINEER

Ceram

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 Rapiant Ct, Lothian, MD 20711

SINAGE CONSULTANT

Patricia Hord Graphix Design

119 S. Asaph St, Alexandria, VA 22314

LANDSCAPE

Lee and Associates, Inc.

6381 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

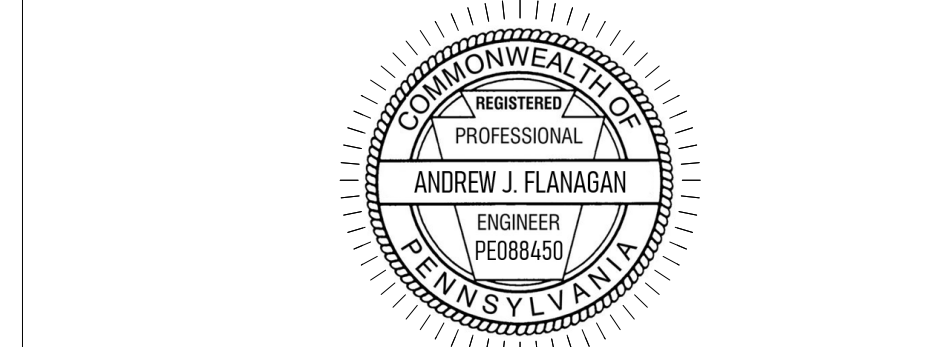
AECOM

1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
4	8 JUN 2023	ADDENDUM 25			

RECORD REVISIONS



SIGNATURE: Andrew J. Flanagan
DATE: 6/9/2023

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

INTERFACE ENGINEERING
PROJECT: 2021-0159
CONTACT: Robert Gannon
1000 M Street NW, Suite 270
Washington, DC 20036
TEL: 202.370.9555
WWW: interfaceengineering.com

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BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING. ADJUST SCALE ACCORDINGLY.
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SHEET NO. **GEN-TC-700**

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			AS NOTED

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LAST SAVED: 2023/05/21 09:10 PM
PLOTTED BY: Xian Chi
PLOT DATE: 2023/05/21 09:10 PM

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
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ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

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164 Brighton Rd, Clifton, NJ 07012

MECHANICAL, AVIATION ENGINEER

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

ACoustical ENGINEER

1001 AVE
1001 AVE of the Americas, 4th Floor, New York, NY 10018

CODE CONSULTING

CCI
119 S 40th St, 10th Floor, New York, NY 10018

CIVIL ENGINEER

Langan
1818 Market St #3300, Philadelphia, PA 19103

VERTICAL TRANSPORT

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SINAGE CONSULTANT

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LANDSCAPE

Lee and Associates, Inc.
6381 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

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

4	8 JUN 2023	ADDENDUM 25					
	NO DATE	DESCRIPTION		NO DATE	DESCRIPTION		

RECORD REVISIONS

<p>ANDREW J. FLANAGAN ENGINEER PROFESSIONAL NO. 5480 PA</p>	6/9/2023 DATE SIGNATURE
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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

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

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SHEET No. **GEN-TC-701**

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System No. F-A-3058

ANSUL1479 (ASTM E814)	CANULC 5115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0, 1 1/2, 3, 1 1/2 and 2 Hr (See Item 3)	FT Ratings - 2 Hr
L Rating At Ambient - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FF Rating - 2 Hr
L Rating At 800 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr
L Rating At 900 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr

1. **Wall Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-100 psf or 5000-2400 kg/m²) concrete or masonry. The framing shall be installed in accordance with the accompanying installation instructions. The Floor Glass System provides one to four studs for mounting banks of four "gangster" firestop device modules and two studs for framing components. The studs and support brackets shall be secured together forming a continuous framing system. The Floor Glass System provides one to four studs for mounting banks of four "gangster" firestop device modules and two studs for framing components. The studs and support brackets shall be secured together forming a continuous framing system. The Floor Glass System provides one to four studs for mounting banks of four "gangster" firestop device modules and two studs for framing components. The studs and support brackets shall be secured together forming a continuous framing system.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44 or Series 44+ Fire Rated Pathway

System No. F-A-3048

ANSUL1479 (ASTM E814)	CANULC 5115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0, 1 1/2, 3, 1 1/2 and 2 Hr (See Item 3)	FT Ratings - 2 Hr
L Rating At Ambient - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FF Rating - 2 Hr
L Rating At 800 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr
L Rating At 900 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr

1. **Wall Assembly** - Min 6-2 in. (114 mm) thick reinforced lightweight or normal weight (100-100 psf or 5000-2400 kg/m²) concrete. Details of framing to be as shown in 1102 mmi.

2. **Firestop Device** - One, two, three, four or five firestop device modules (gangster) together and secured by means of integral hook and pin or wedge anchoring. Firestop device modules shall be installed in accordance with the accompanying installation instructions. Firestop device modules shall be installed in accordance with the accompanying installation instructions. Firestop device modules shall be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44 or Series 44+ Fire Rated Pathway

System No. F-A-3037

ANSUL1479 (ASTM E814)	CANULC 5115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0 and 2 Hr (See Item 4 and 5)	FT Ratings - 2 Hr
L Rating At Ambient - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FF Rating - 2 Hr
L Rating At 800 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr
L Rating At 900 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr

1. **Floor Assembly** - Min 2-1/2 in. (63 mm) thick reinforced lightweight or normal weight (100-100 psf or 5000-2400 kg/m²) concrete. The frame of the Floor Glass System shall be installed with precast concrete or steel framing through the use of bolts and nuts (provided). The frame of the Floor Glass System shall be installed with precast concrete or steel framing through the use of bolts and nuts (provided).

2. **Firestop Device** - One, two, three, four or five firestop device modules (gangster) together and secured by means of integral hook and pin or wedge anchoring. Firestop device modules shall be installed in accordance with the accompanying installation instructions. Firestop device modules shall be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. W-L-3306

ANSUL1479 (ASTM E814)	CANULC 5115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 1 or 2 Hr (See Item 1)	FT Rating - 1 or 2 Hr (See Item 1)
L Rating At Ambient - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FF Rating - 1 or 2 Hr (See Item 1)
L Rating At 800 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 1 or 2 Hr (See Item 1)
L Rating At 900 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 1 or 2 Hr (See Item 1)

1. **Wall Assembly** - The 1 or 2 hr rated gypsum board/wood wall assembly shall be constructed of the materials and in the manner described within the individual UL100, UL405, UL409 or VDO Series Wall and Partition Designs in the UL Fire Resistance Directory and shall incorporate the following construction features.

2. **Firestop Device** - One, two, three, four or five firestop device modules (gangster) together and secured by means of integral hook and pin or wedge anchoring. Firestop device modules shall be installed in accordance with the accompanying installation instructions. Firestop device modules shall be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. W-J-3158

ANSUL1479 (ASTM E814)	CANULC 5115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0, 1 1/2, 3, 1 1/2 and 2 Hr (See Item 3)	FT Ratings - 0, 1 1/2, 3, 1 1/2 and 2 Hr (See Item 3)
L Rating At Ambient - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FF Rating - 2 Hr
L Rating At 800 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr
L Rating At 900 F - Less Than 1.3 1/8 or CFM/Device Module (See Item 2)	FTH Rating - 2 Hr

1. **Wall Assembly** - Min 5 in. (127 mm) thick reinforced lightweight or normal weight (100-100 psf or 5000-2400 kg/m²) concrete or masonry. The framing shall be installed in accordance with the accompanying installation instructions.

2. **Firestop Device** - One, two, three, four or five firestop device modules (gangster) together and secured by means of integral hook and pin or wedge anchoring. Firestop device modules shall be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - 210 Evans Way Somerville, NJ 08878

Device	Cable Type	L-Rating (CFM)
		Anchor
		400 F
0%	-	Less Than 1
1-25%	AA-4l	1.5
26-50%	AA-4l	2.3
51-75%	AA-4l	2.3
76-100%	AA-4l	2.3

System No. F-A-3058

3. **Cables** - Cables may represent 0 to 100 percent of the loading area for the firestop device module. Cables to be rigidly supported on both sides of the wall assembly. Any combination of the following types of cables may be used:

- A. Max 400 pair No. 24 AWG or smaller copper conductor telecommunication cable with polyvinyl chloride (PVC) or plenum-rated jacketing and insulation.
- B. Max 750 kcmil single copper conductor power cable with XLPE jacket and insulation.
- C. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- D. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- E. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.
- F. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- G. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- H. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.

4. **Firestop Device - Extension Module** - (Optional, Not Shown) - Module attached to ends of firestop device (Item 2) to increase its length to facilitate installation in thicker walls. Each module consists of a 4 by 4.58 by 8 in. (102 by 118 by 152 mm) long galv steel plate with an instrumented material strip. Extension module to be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. F-A-3048

Part No.	Description	Max. No. of Modules	Max Opening Size
EZ0044L or EZ0044R	Single Bank Floor Glass System	4	(18 x 24) (457 x 610)
EZ2044L or EZ2044R	Double Bank Floor Glass System	16	(74 x 59) (188 x 1500)
EZ0044M or EZ0044S	Double Bank Floor Glass System	16	(205 x 457) (518 x 1146)
EZ2044M or EZ2044S	Double Bank Floor Glass System	16	(205 x 457) (518 x 1146)

3. **Cables** - Cables may represent 0 to 100 percent of the loading area for the firestop device module. Cables to be rigidly supported on both sides of the floor assembly. Any combination of the following types of cables may be used:

- A. Max 400 pair No. 24 AWG or smaller copper conductor telecommunication cable with polyvinyl chloride (PVC) or plenum-rated jacketing and insulation.
- B. Max 750 kcmil single copper conductor power cable with XLPE jacket and insulation.
- C. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- D. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- E. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.
- F. Max 3C No. 24 AWG or smaller copper conductor data cable with XLPE jacket and insulation.
- G. Coaxial cable with fluorinated ethylene or PVC insulation and jacketing of plenum rated jacketing and insulation having a max. diam of 0.5 in. (12.7 mm).
- H. Optical fiber cable with PVC or polyethylene (PE) jacket and insulation of plenum rated jacketing and insulation and having a max. diam of 0.5 in. (12.7 mm).

4. **Firestop Device - Extension Module** - (Optional, Not Shown) - Module attached to ends of firestop device (Item 2) to increase its length to facilitate installation in thicker floors. Each module consists of a 4 by 4.58 by 8 in. (102 by 118 by 152 mm) long galv steel plate with an instrumented material strip. Extension module to be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. F-A-3037

3. **Cables** - Cables may represent 0 to 100 percent of the loading area for the firestop device module. Cables to be rigidly supported on both sides of the floor assembly. Any combination of the following types of cables may be used:

- A. Max 400 pair No. 24 AWG or smaller copper conductor telecommunication cable with polyvinyl chloride (PVC) or plenum-rated jacketing and insulation.
- B. Max 750 kcmil single copper conductor power cable with XLPE jacket and insulation.
- C. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- D. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- E. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.
- F. Max 3C No. 24 AWG or smaller copper conductor data cable with XLPE jacket and insulation.
- G. Coaxial cable with fluorinated ethylene or PVC insulation and jacketing of plenum rated jacketing and insulation having a max. diam of 0.5 in. (12.7 mm).
- H. Optical fiber cable with PVC or polyethylene (PE) jacket and insulation of plenum rated jacketing and insulation and having a max. diam of 0.5 in. (12.7 mm).

4. **Firestop Device - Extension Module** - (Optional, Not Shown) - Module attached to ends of firestop device (Item 2) to increase its length to facilitate installation in thicker floors. Each module consists of a 4 by 4.58 by 8 in. (102 by 118 by 152 mm) long galv steel plate with an instrumented material strip. Extension module to be installed in accordance with the accompanying installation instructions.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. W-L-3306

3. **Cables** - Cables may represent 0 to 100 percent of the loading area for the firestop device module. Cables to be rigidly supported on both sides of the wall assembly. Any combination of the following types of cables may be used:

- A. Max 400 pair No. 24 AWG or smaller copper conductor telecommunication cable with polyvinyl chloride (PVC) or plenum-rated jacketing and insulation.
- B. Max 750 kcmil single copper conductor power cable with XLPE jacket and insulation.
- C. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- D. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- E. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.
- F. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- G. Coaxial cable with fluorinated ethylene or PVC insulation and jacketing having a max. diam of 0.5 in. (12.7 mm).
- H. Optical fiber cable with PVC or polyethylene (PE) jacket and insulation and having a max. diam of 0.5 in. (12.7 mm).

4. **Firestop Device - Extension Module** - (Optional, Not Shown) - Module attached to ends of firestop device (Item 2) to increase its length to facilitate installation in thicker walls. Each module consists of a 4 by 4.58 by 8 in. (102 by 118 by 152 mm) long galv steel plate with an instrumented material strip. Extension module to be installed in accordance with the accompanying installation instructions. When extension module is used, firestop device (Item 2) and extension module installed on each side of wall and secured to each end with steel brackets. Wall brackets installed with precast metal support with precast steel brackets installed on both ends of wall and secured to structural device module by means of steel set screws provided with brackets. Wall brackets installed on each side of wall through precast hollow brackets by means of steel set screws provided with brackets. Wall brackets installed on each side of wall through precast hollow brackets by means of steel set screws provided with brackets. Wall brackets installed on each side of wall through precast hollow brackets by means of steel set screws provided with brackets.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

System No. W-J-3158

3. **Cables** - Cables may represent 0 to 100 percent of the loading area for the firestop device module. Cables to be rigidly supported on both sides of the wall assembly. Any combination of the following types of cables may be used:

- A. Max 400 pair No. 24 AWG or smaller copper conductor telecommunication cable with polyvinyl chloride (PVC) or plenum-rated jacketing and insulation.
- B. Max 750 kcmil single copper conductor power cable with XLPE jacket and insulation.
- C. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- D. Max 3C No. 20 AWG metal clad or armoured cable with steel or aluminum jacket.
- E. Max 3C No. 8 AWG NM cable (Romex) with PVC insulation and jacket.
- F. Max 3C No. 12 AWG copper conductor control cable with PVC or XLPE jacket and insulation.
- G. Coaxial cable with fluorinated ethylene or PVC insulation and jacketing having a max. diam of 0.5 in. (12.7 mm).
- H. Optical fiber cable with PVC or polyethylene (PE) jacket and insulation and having a max. diam of 0.5 in. (12.7 mm).

4. **Firestop Device - Extension Module** - (Optional, Not Shown) - Module attached to ends of firestop device (Item 2) to increase its length to facilitate installation in thicker walls. Each module consists of a 4 by 4.58 by 8 in. (102 by 118 by 152 mm) long galv steel plate with an instrumented material strip. Extension module to be installed in accordance with the accompanying installation instructions. When extension module is used, firestop device (Item 2) and extension module installed on each side of wall and secured to each end with steel brackets. Wall brackets installed with precast metal support with precast steel brackets installed on both ends of wall and secured to structural device module by means of steel set screws provided with brackets. Firestop device and extension module assembly to be installed with ends projecting an equal distance beyond each surface of the wall assembly.

SPECIFIED TECHNOLOGIES INC. - EZ PATH Series 44+ Extension

5 EZ-PATH SYSTEM NO. F-A-3058

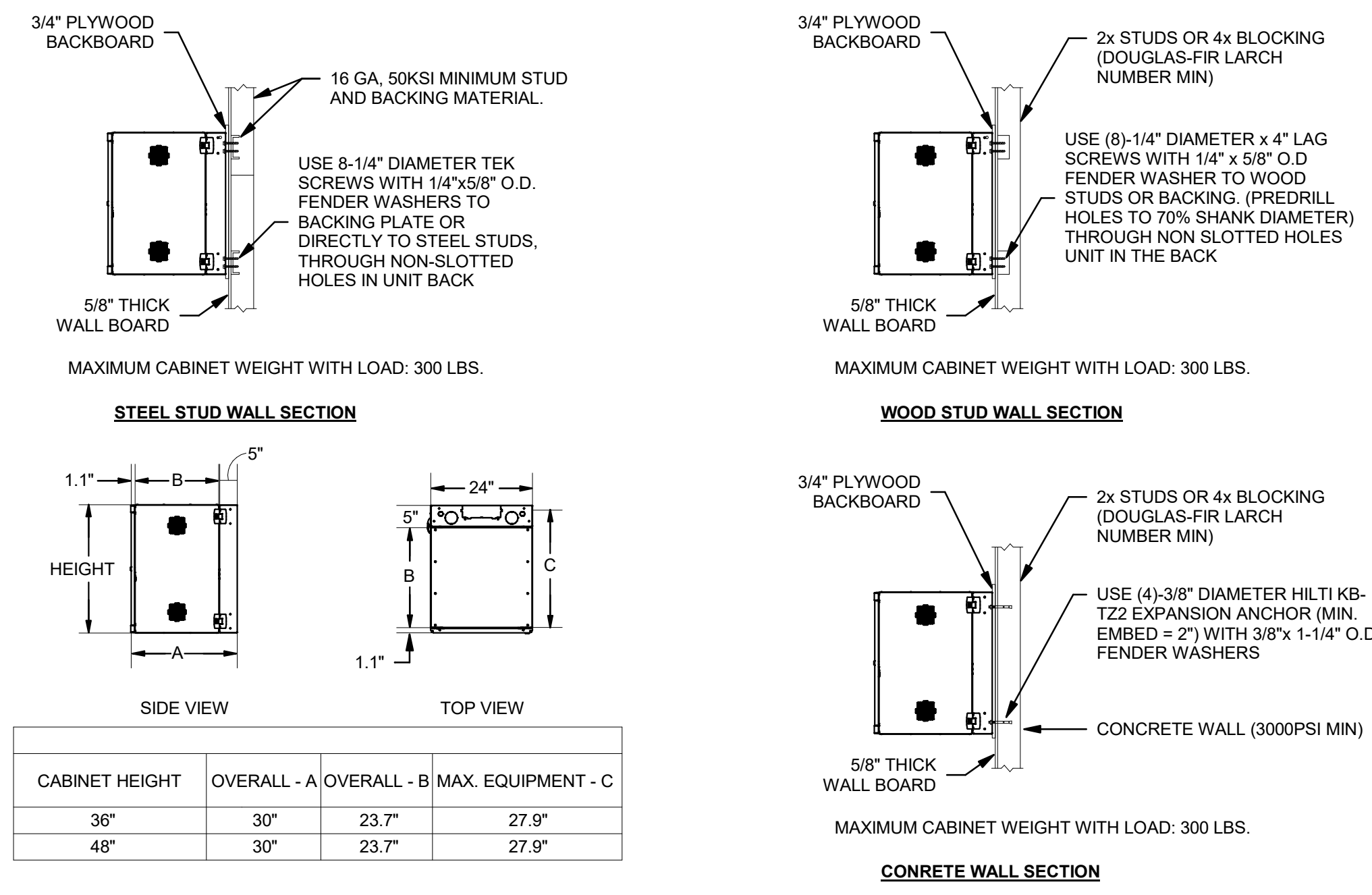
4 EZ-PATH SYSTEM NO. F-A-3048

3 EZ-PATH SYSTEM NO. F-A-0307

2 EZ-PATH SYSTEM NO. W-L-3306

1 EZ-PATH SYSTEM NO. W-J-3158

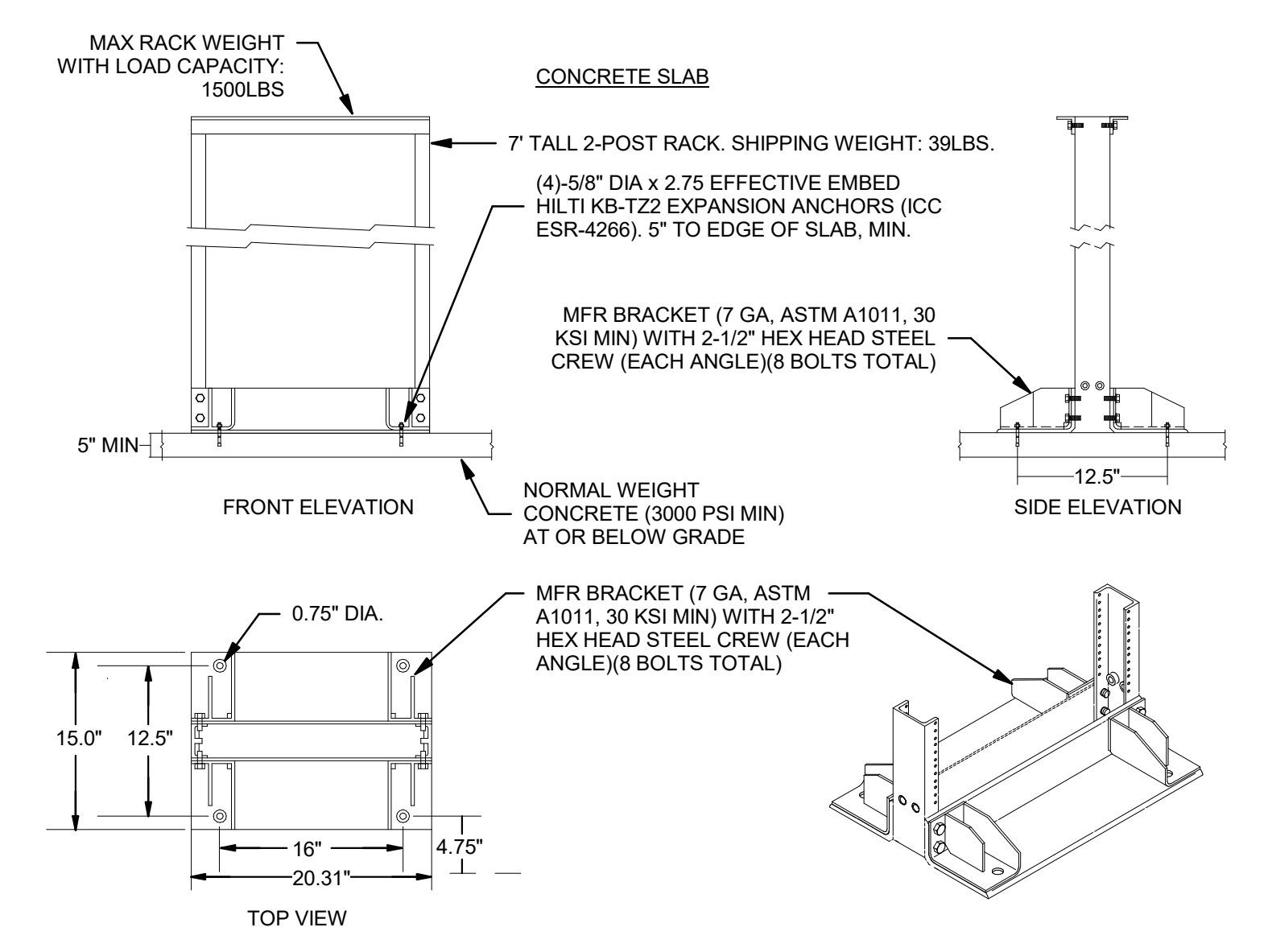
PLOTTED BY: Xue Chen



NOTE: REFER TO OSHPD OPM 0196-13

1 CUBE-IT WALL MOUNT CABINET MOUNTING DETAIL

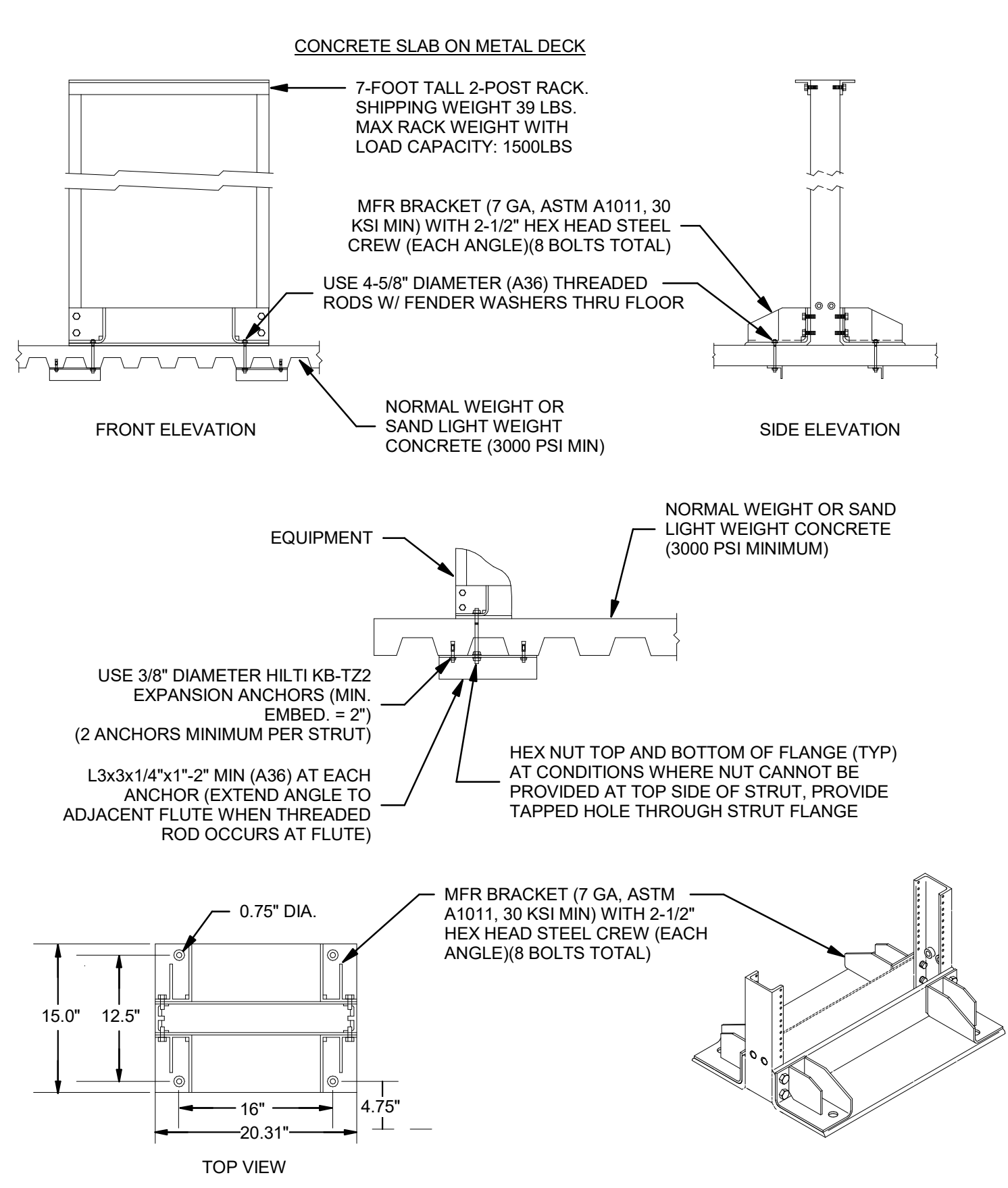
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NOTE: REFER TO OSHPD OPM 0261-13

2 UNIVERSAL 2-POST RACK ON CONCRETE SLAB DETAIL

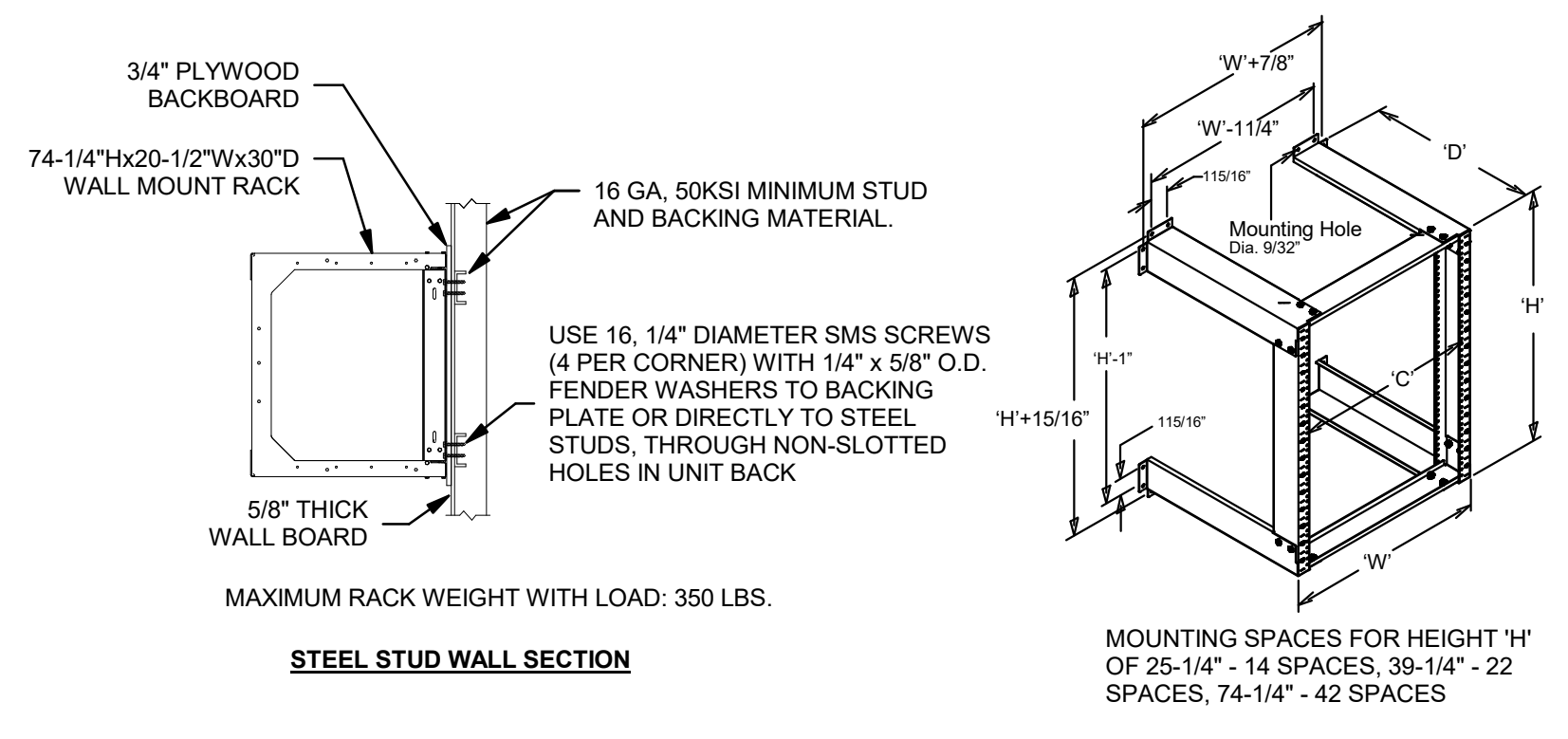
NO SCALE



NOTE: REFER TO OSHPD OPM 0261-13

3 UNIVERSAL 2-POST RACK ON CONCRETE SLAB ON METAL DECK DETAIL

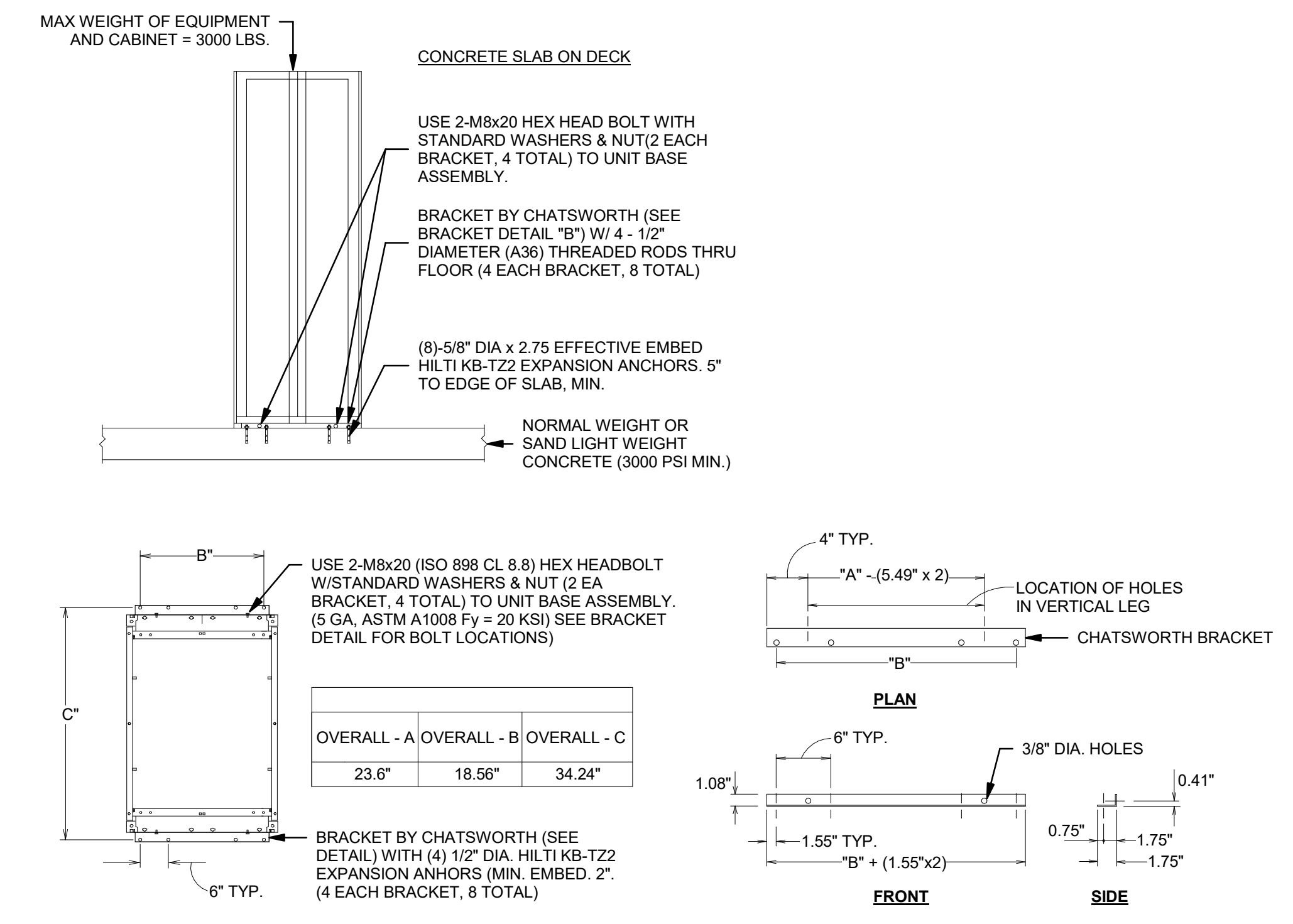
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NOTE: REFER TO OSHPD OPA 2431-07

4 WALL MOUNT RACK MOUNTING DETAIL

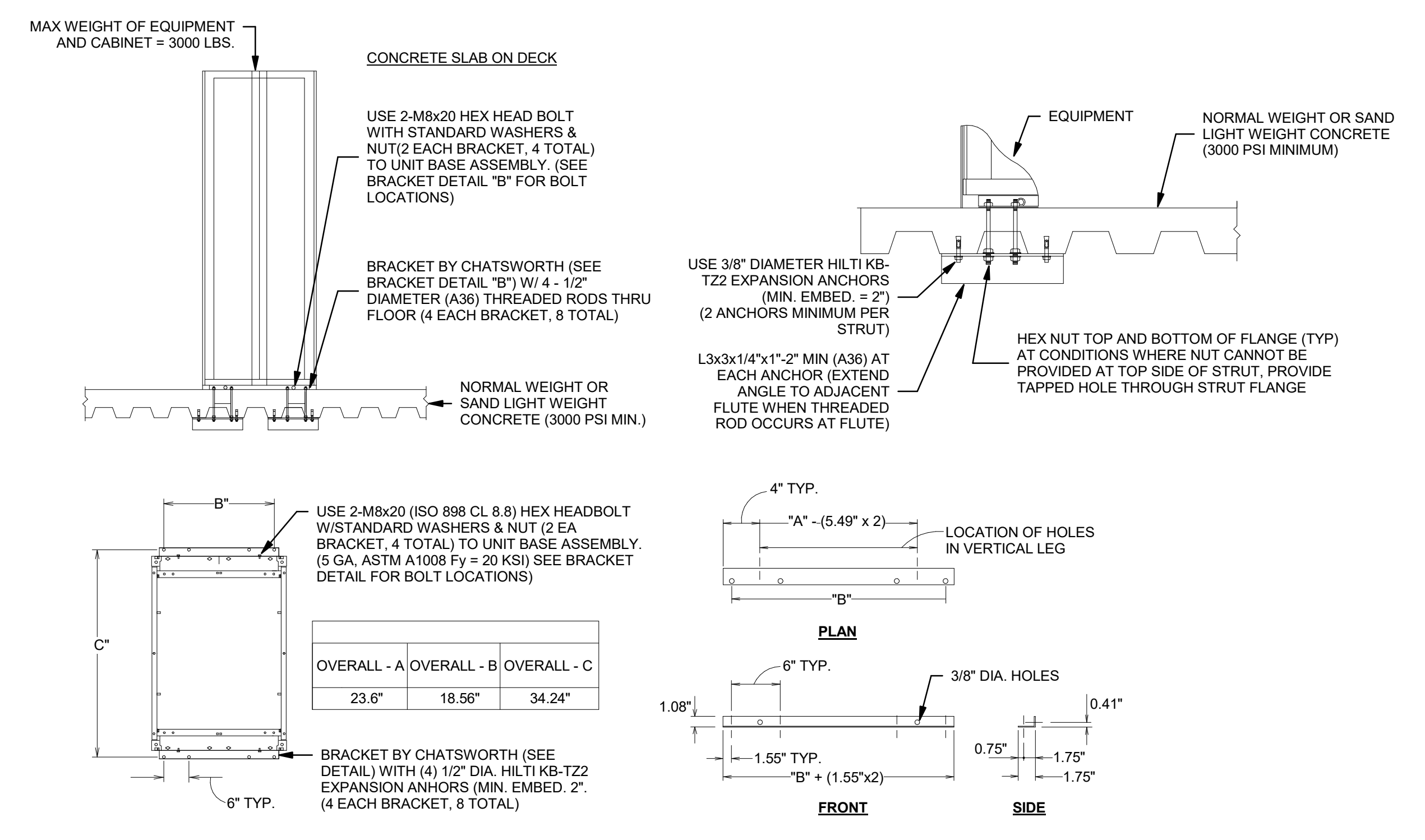
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NOTE: REFER TO OSHPD OPM 0348-13

5 GLOBALFRAME CABINET MOUNTING ON CONCRETE SLAB DETAIL

NO SCALE



NOTE: REFER TO OSHPD OPM 0348-13

6 GLOBALFRAME CABINET MOUNTING ON CONCRETE FILLED METAL DECK DETAIL

NO SCALE

TACTICAL TRAINING DESIGN

Tactical Design North
231 E. Buffalo St #502, Milwaukee, WI 53202

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POOL DESIGN

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1	8 JUN 2023	ADDENDUM 25			

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SIGNATURE: [Signature] DATE: 6/9/2023

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
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INTERFACE ENGINEERING
PROJECT: 2021-0159
CONTACT: Robert Gannon
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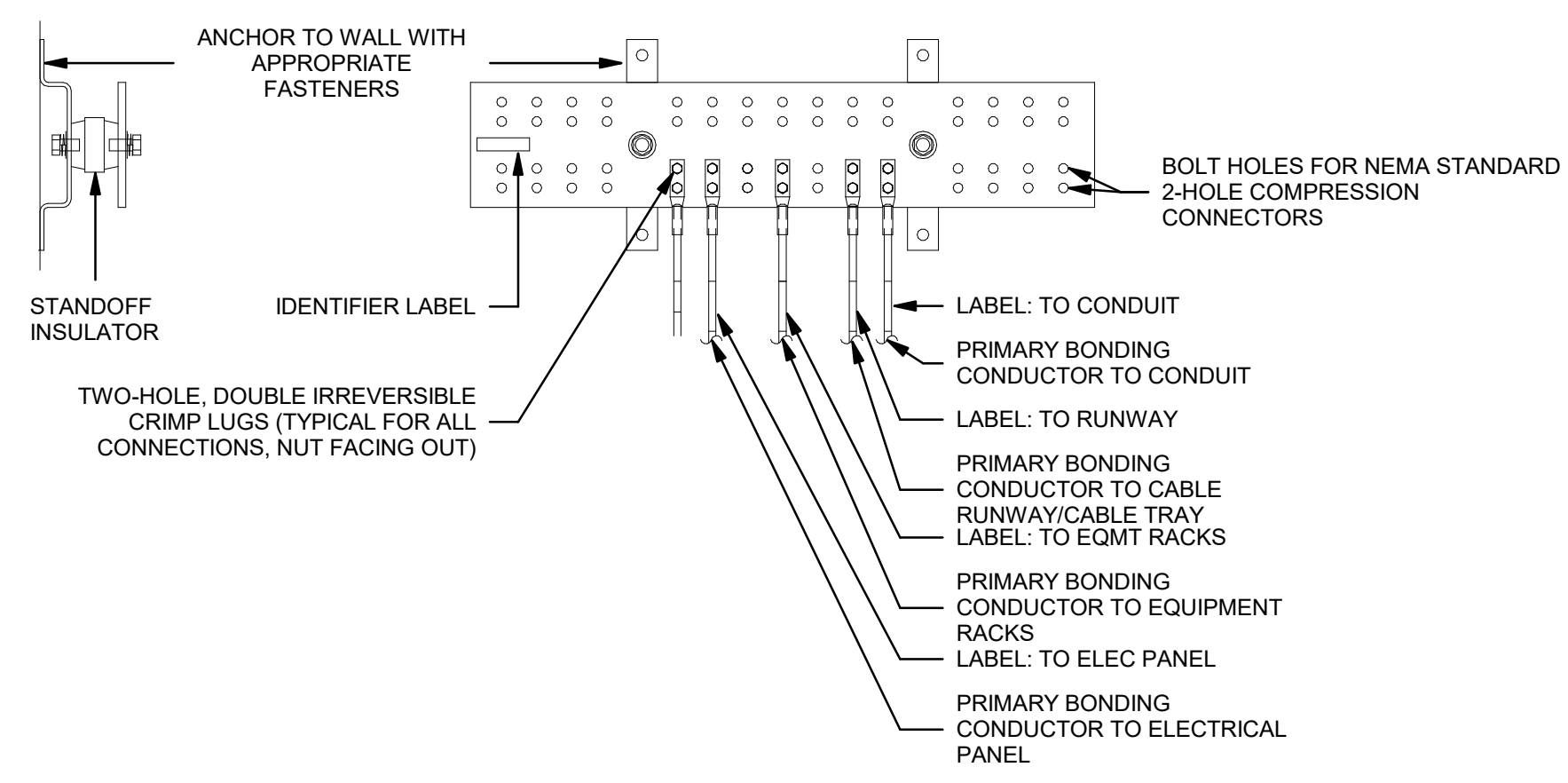
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SHEET No. **GEN-TC-702**

DRAWN BY: AD CHECKED BY: MT DATE: SCALE: AS NOTED

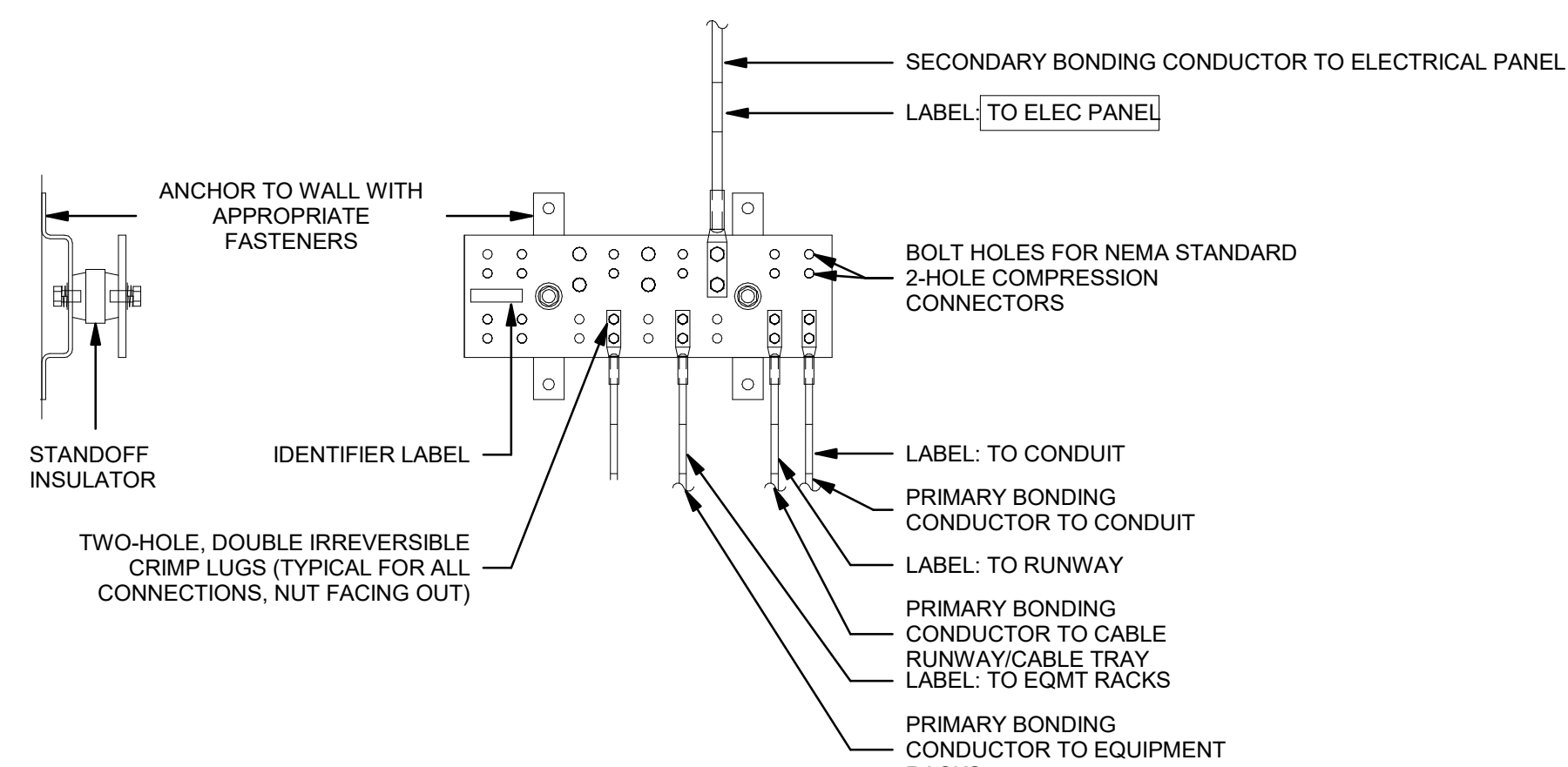
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BONDING CONDUCTOR LINEAR LENGTH m(ft)	CONDUCTOR SIZE (AWG)
LESS THAN 4 (13)	6
4 - 6 (14 - 20)	4
6 - 8 (21 - 26)	3
8 - 10 (27 - 33)	2
10 - 13 (34 - 41)	1
13 - 16 (42 - 52)	1/0
16 - 20 (53 - 56)	2/0
20 - 26 (27 - 33)	3/0
26 - 32 (85 - 105)	4/0
32 - 38 (106 - 125)	250 kcmil
38 - 46 (126 - 150)	300 kcmil
46 - 53 (151 - 175)	350 kcmil
53 - 76 (176 - 250)	500 kcmil
76 - 91 (251 - 300)	600 kcmil
GREATER THAN 91 (301)	750 kcmil

1 PRIMARY BUSBAR (PBB) DETAIL

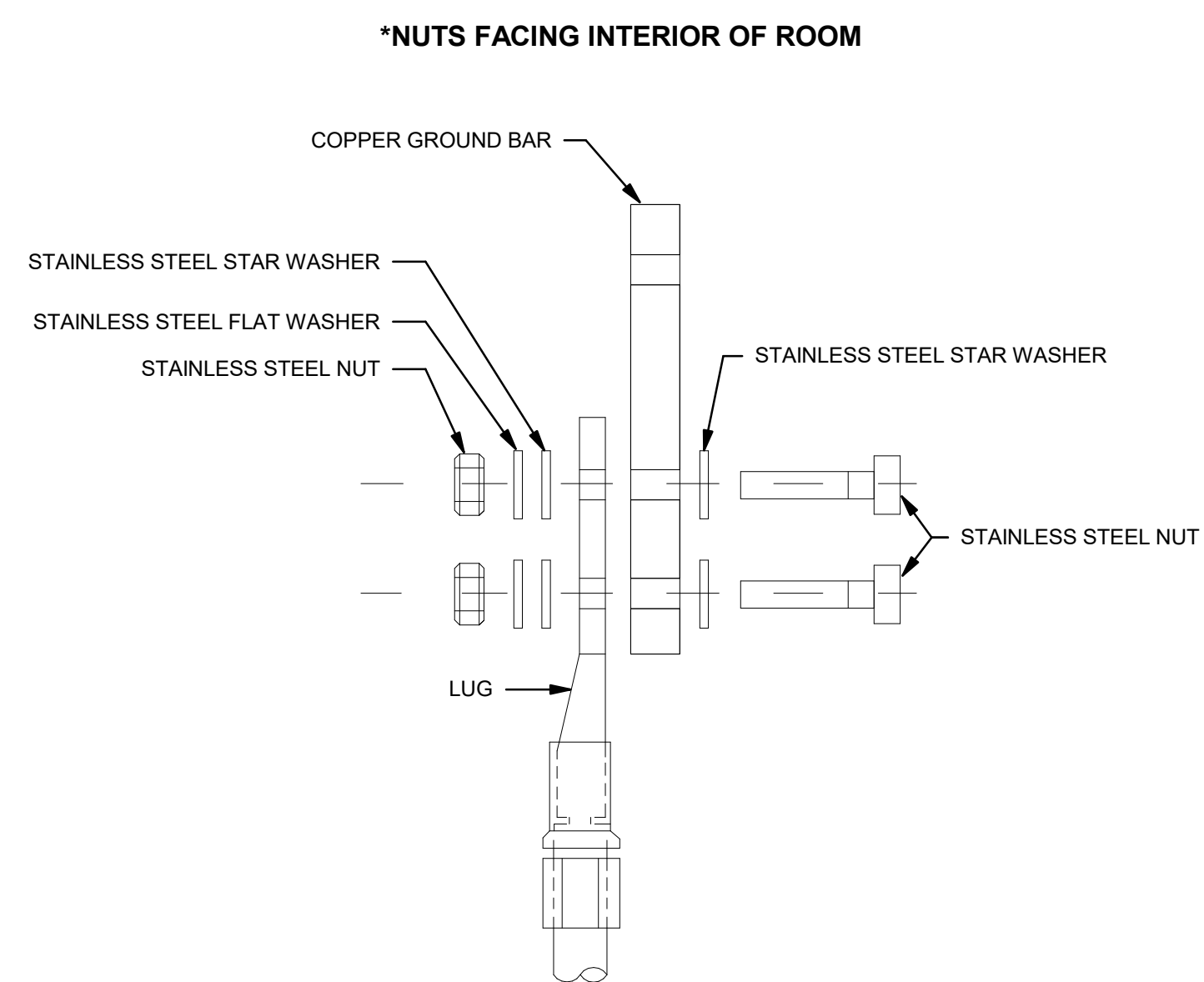
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BONDING CONDUCTOR LINEAR LENGTH m(ft)	CONDUCTOR SIZE (AWG)
LESS THAN 4 (13)	6
4 - 6 (14 - 20)	4
6 - 8 (21 - 26)	3
8 - 10 (27 - 33)	2
10 - 13 (34 - 41)	1
13 - 16 (42 - 52)	1/0
16 - 20 (53 - 56)	2/0
20 - 26 (27 - 33)	3/0
26 - 32 (85 - 105)	4/0
32 - 38 (106 - 125)	250 kcmil
38 - 46 (126 - 150)	300 kcmil
46 - 53 (151 - 175)	350 kcmil
53 - 76 (176 - 250)	500 kcmil
76 - 91 (251 - 300)	600 kcmil
GREATER THAN 91 (301)	750 kcmil

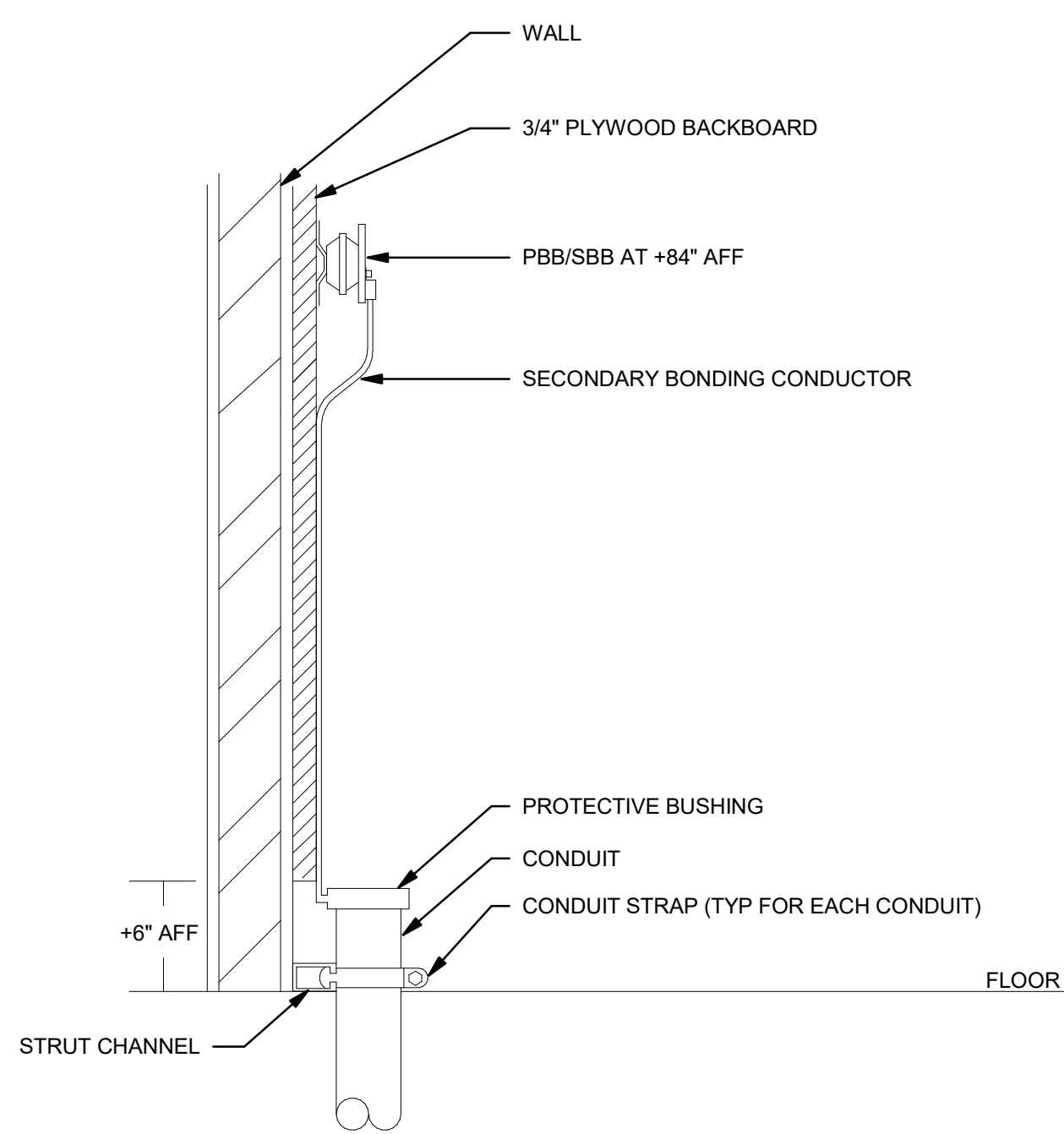
2 SECONDARY BUSBAR (SBB) DETAIL

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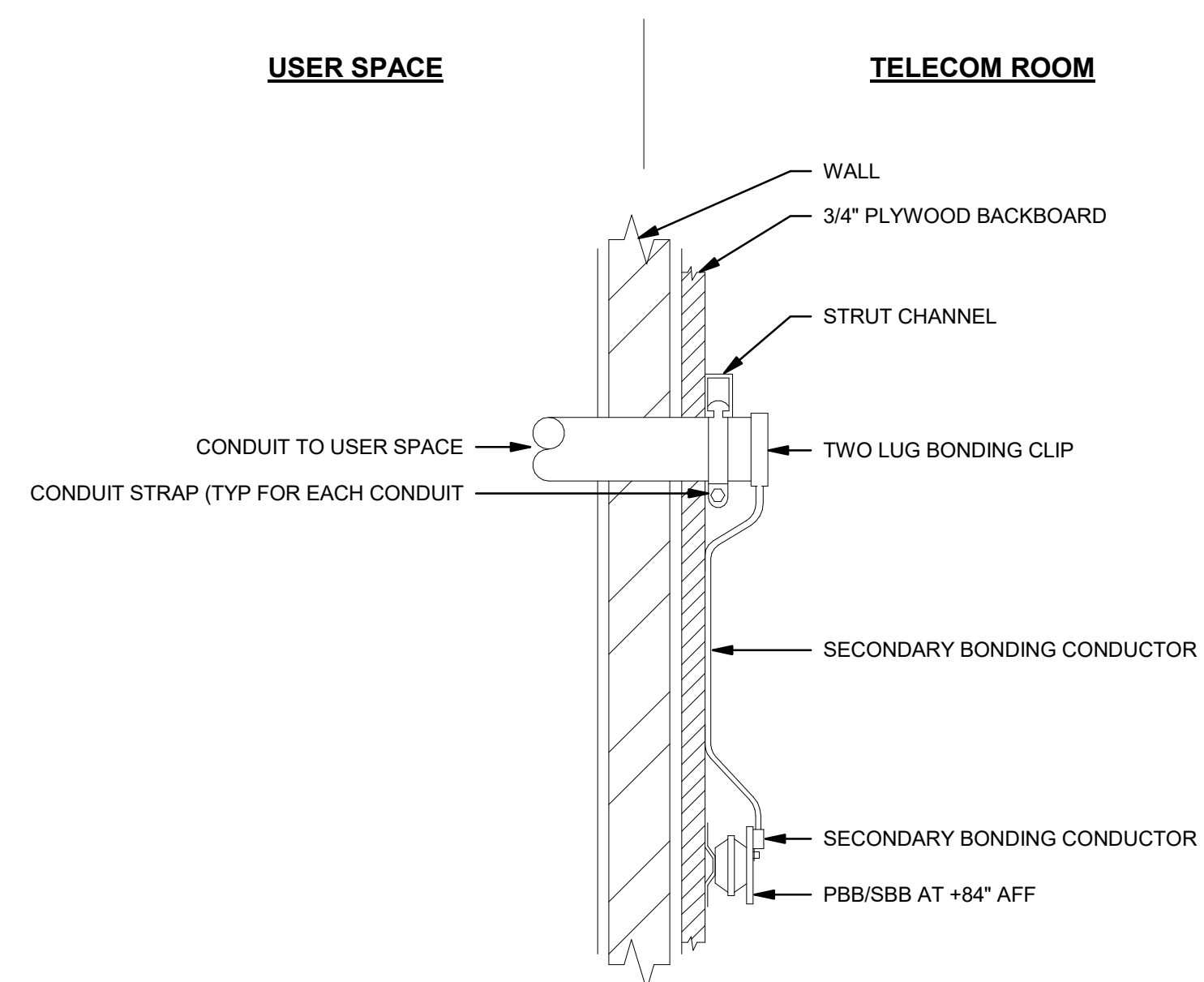
3 BONDING CONDUCTOR TO BUSBAR DETAIL

NO SCALE



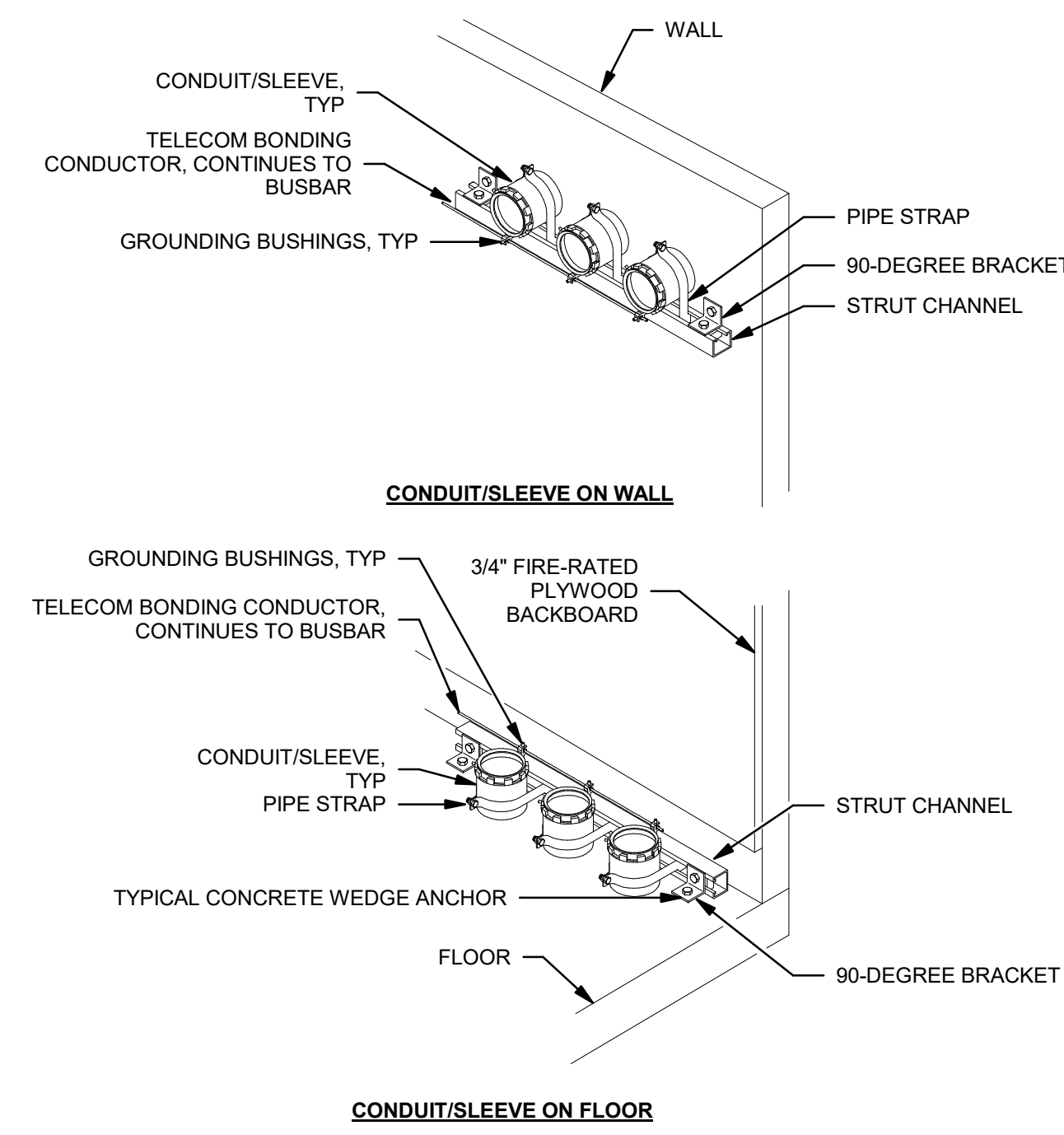
4 CONDUIT THROUGH FLOOR PENETRATION BONDING DETAIL

NO SCALE



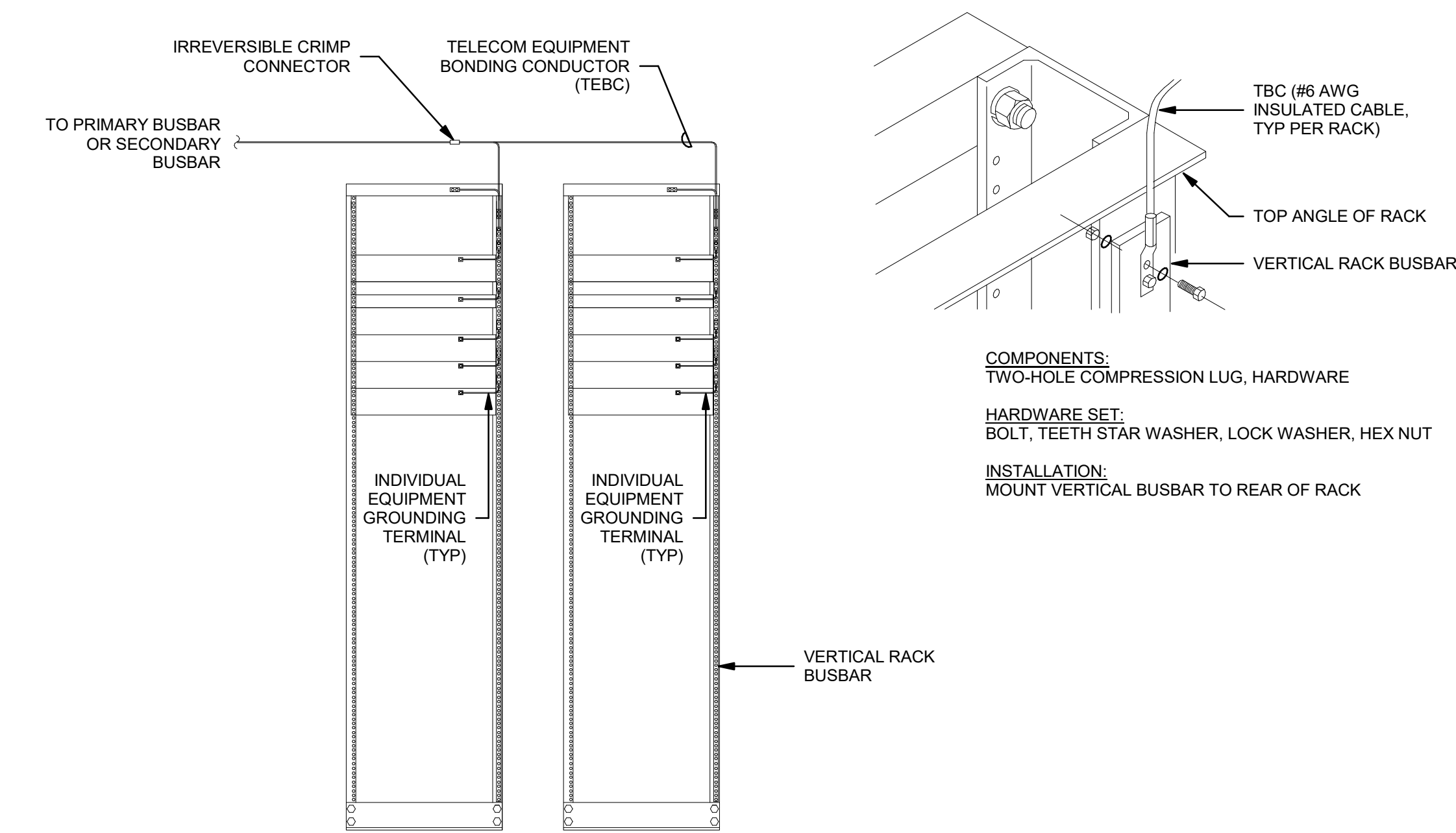
5 TELECOM THROUGH WALL PENETRATION CONDUIT BONDING DETAIL

NO SCALE



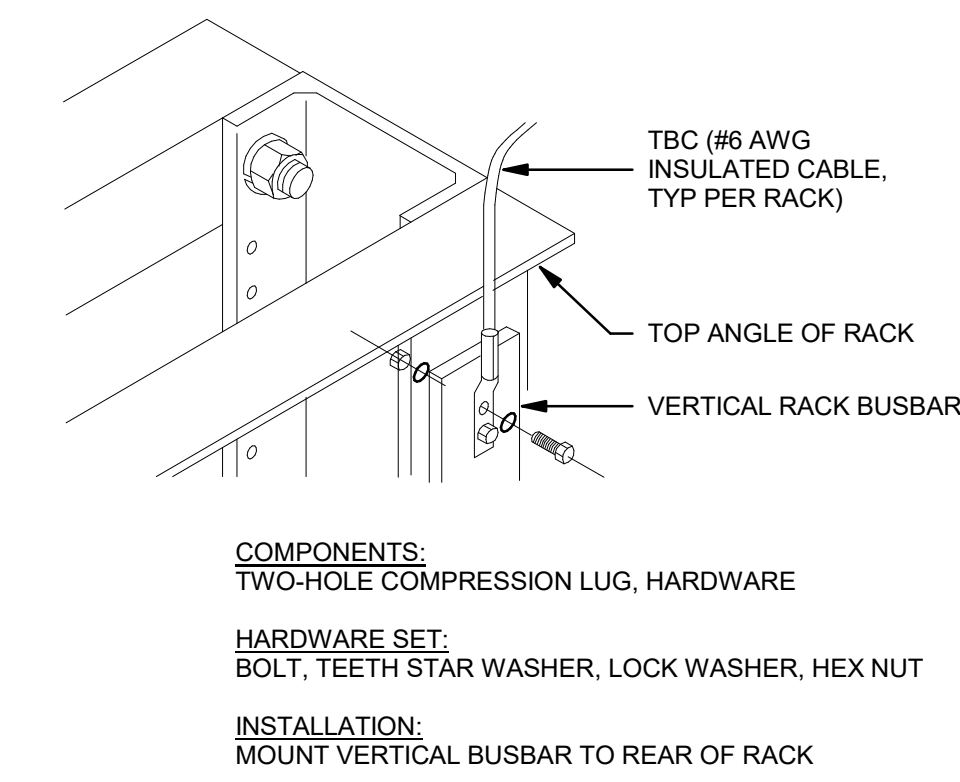
6 CONDUITS/SLEEVES BONDING DETAIL

NO SCALE



7 TELECOM RACK BONDING ON VERTICAL RACK BUSBAR DETAIL

NO SCALE



TACTICAL TRAINING DESIGN

Tactical Design North
231 E. Buffalo St #502, Milwaukee, WI 53202

LOCAL ARCHITECT

Jacobs Wyper Architects
1232 Chancellor St, Philadelphia, PA 19107

STRUCTURAL ENGINEER

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

ELECTRICAL, PLUMBING, FIRE PROTECTION, FIRE ALARM ENGINEER

A & J Consulting Engineering Services, P.C.
164 Brighton Rd, Clifton, NJ 07012

MECHANICAL, 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 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

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7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
4	8 JUN 2023	ADDENDUM 25			

RECORD REVISIONS

6/9/2023
DATE

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250 Greenwich St, New York, 10007

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

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

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

DETAILS - TELECOMMUNICATIONS

GEN-TC-703

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

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INTERFACE ENGINEERING

PROJECT: 2021-0159
CONTACT: Robert Gannon
6000 M Street NW, Suite 270
Washington, DC 20036
TEL: 202-370-9555
www.interfaceengineering.com

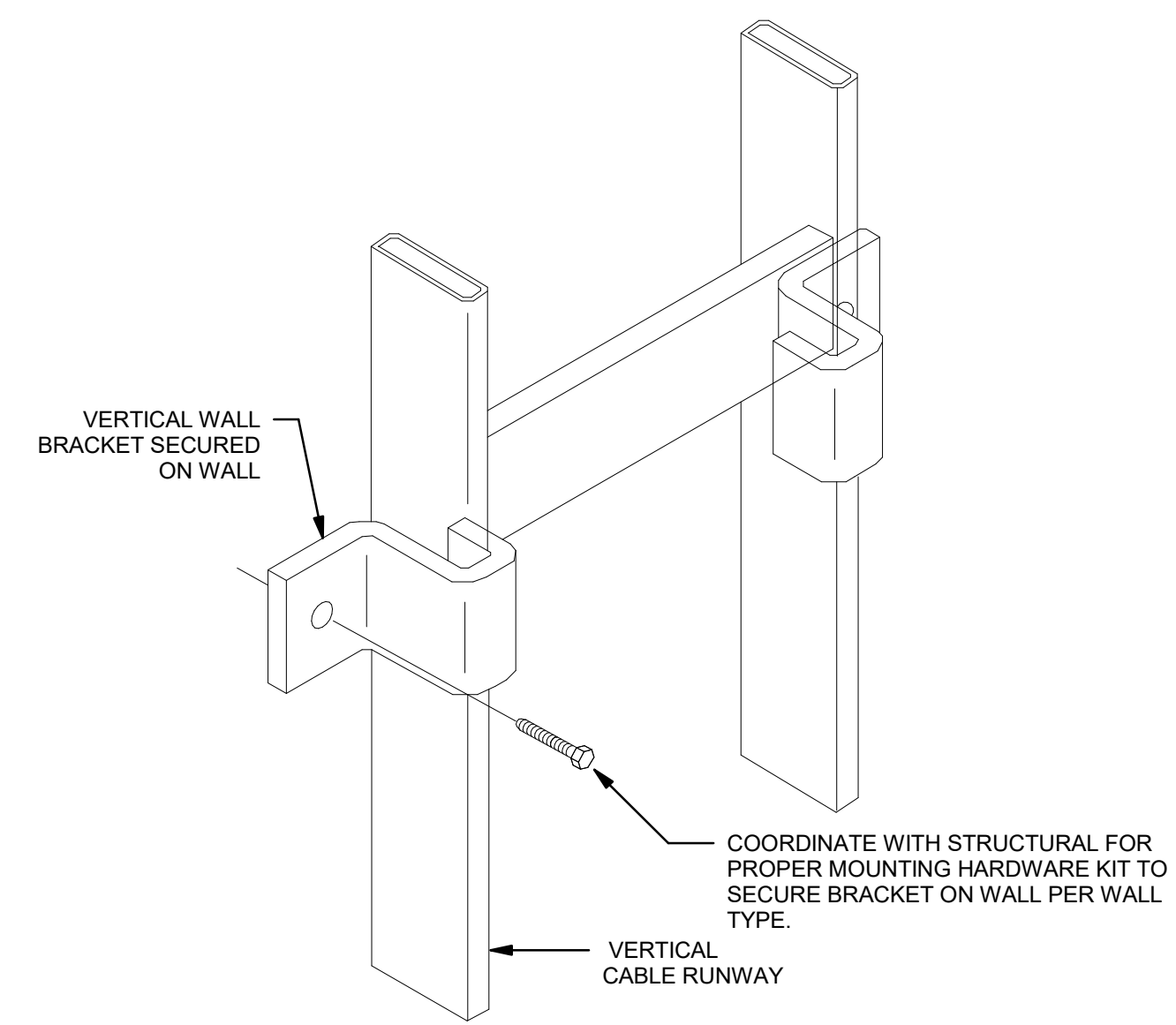
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IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

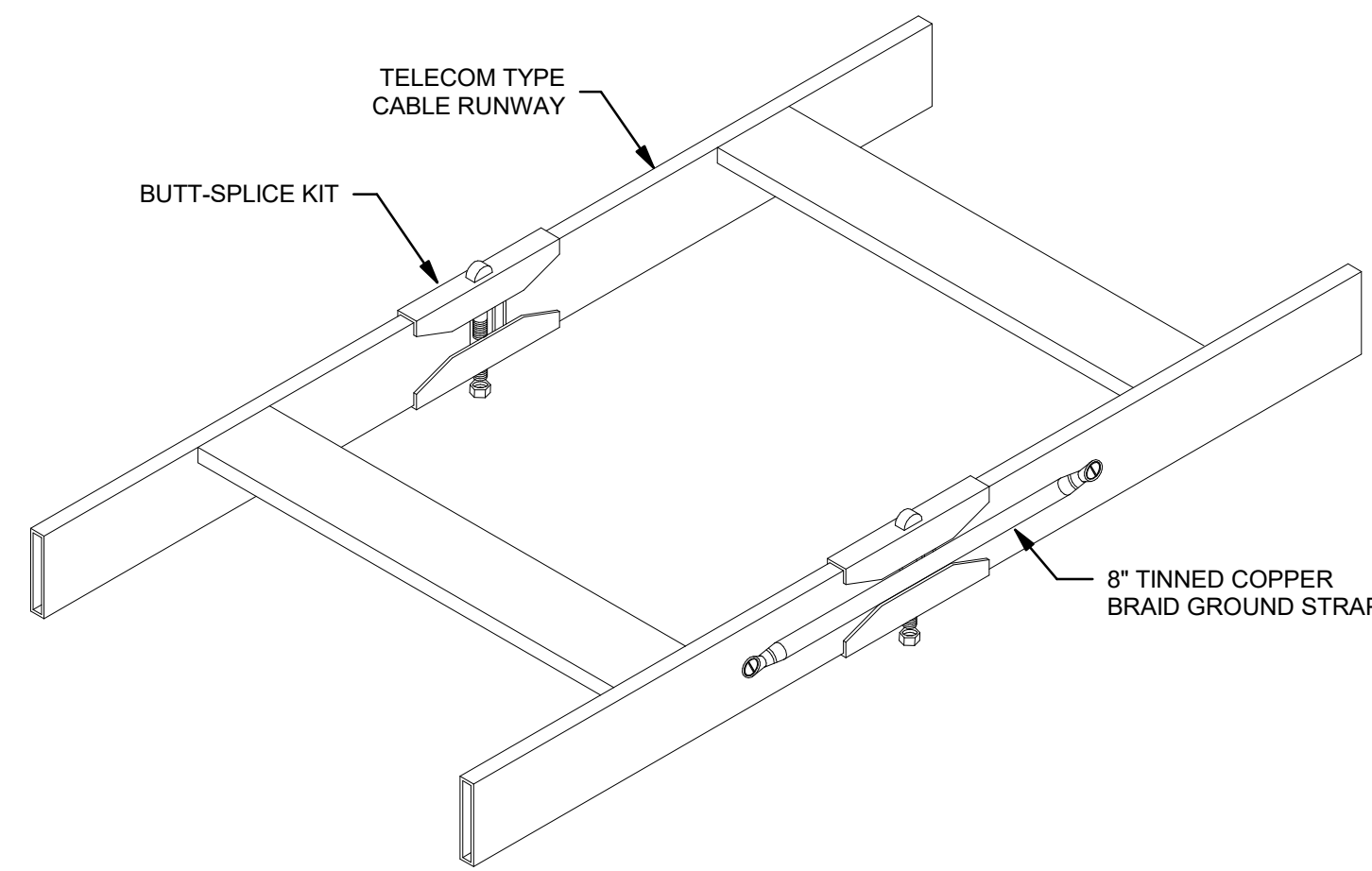
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

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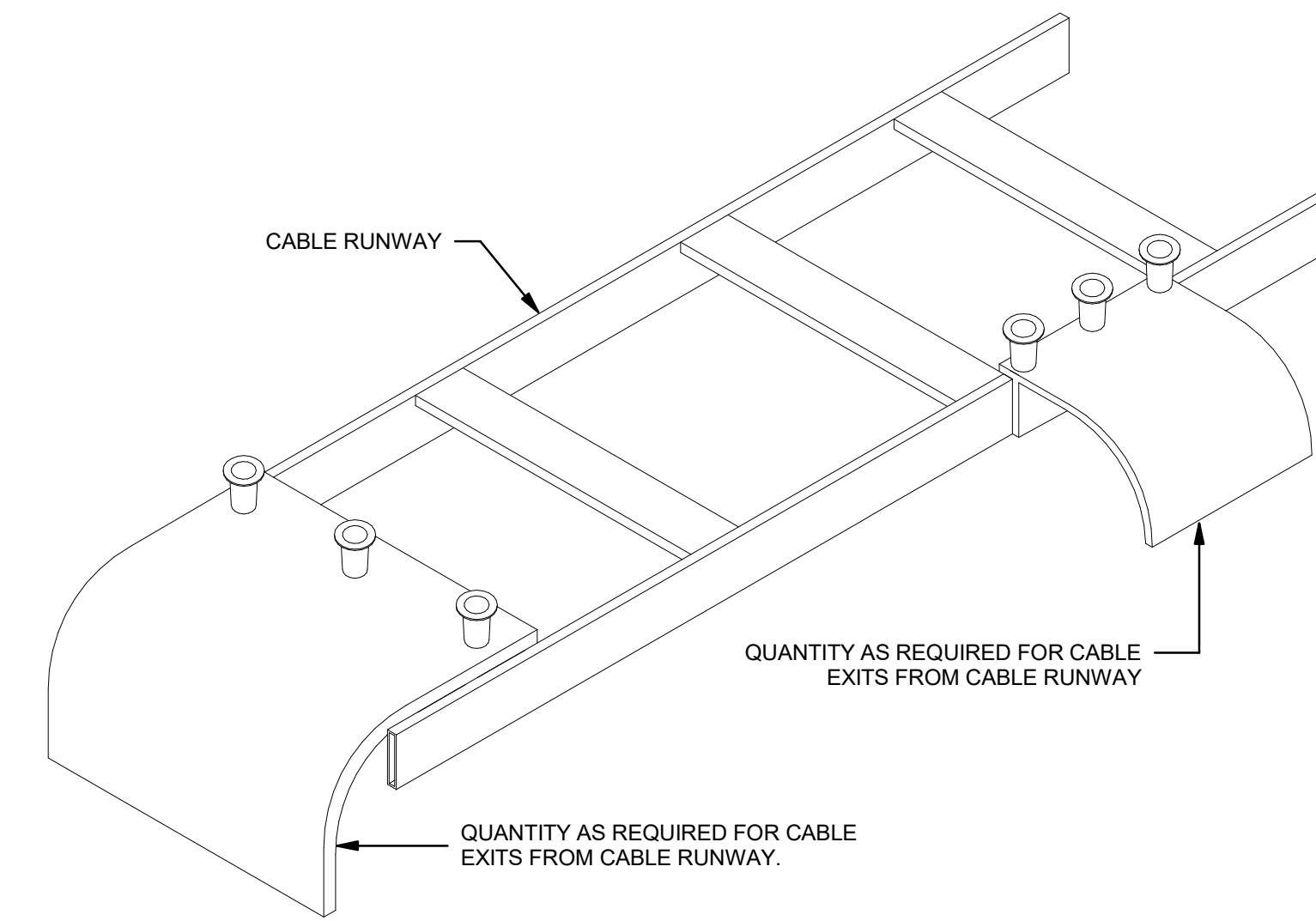
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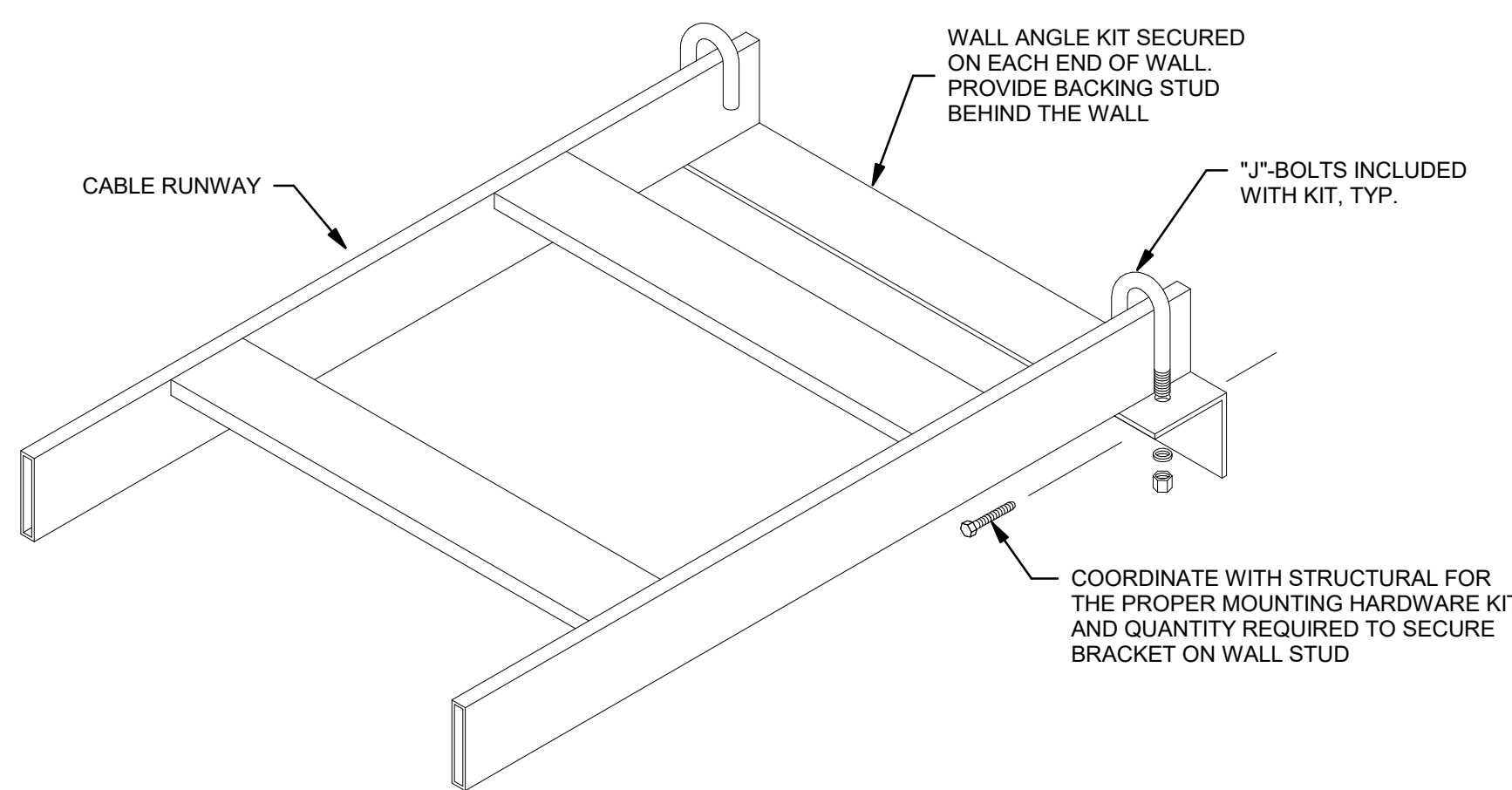
1 CABLE RUNWAY VERTICAL WALL BRACKET DETAIL
NO SCALE



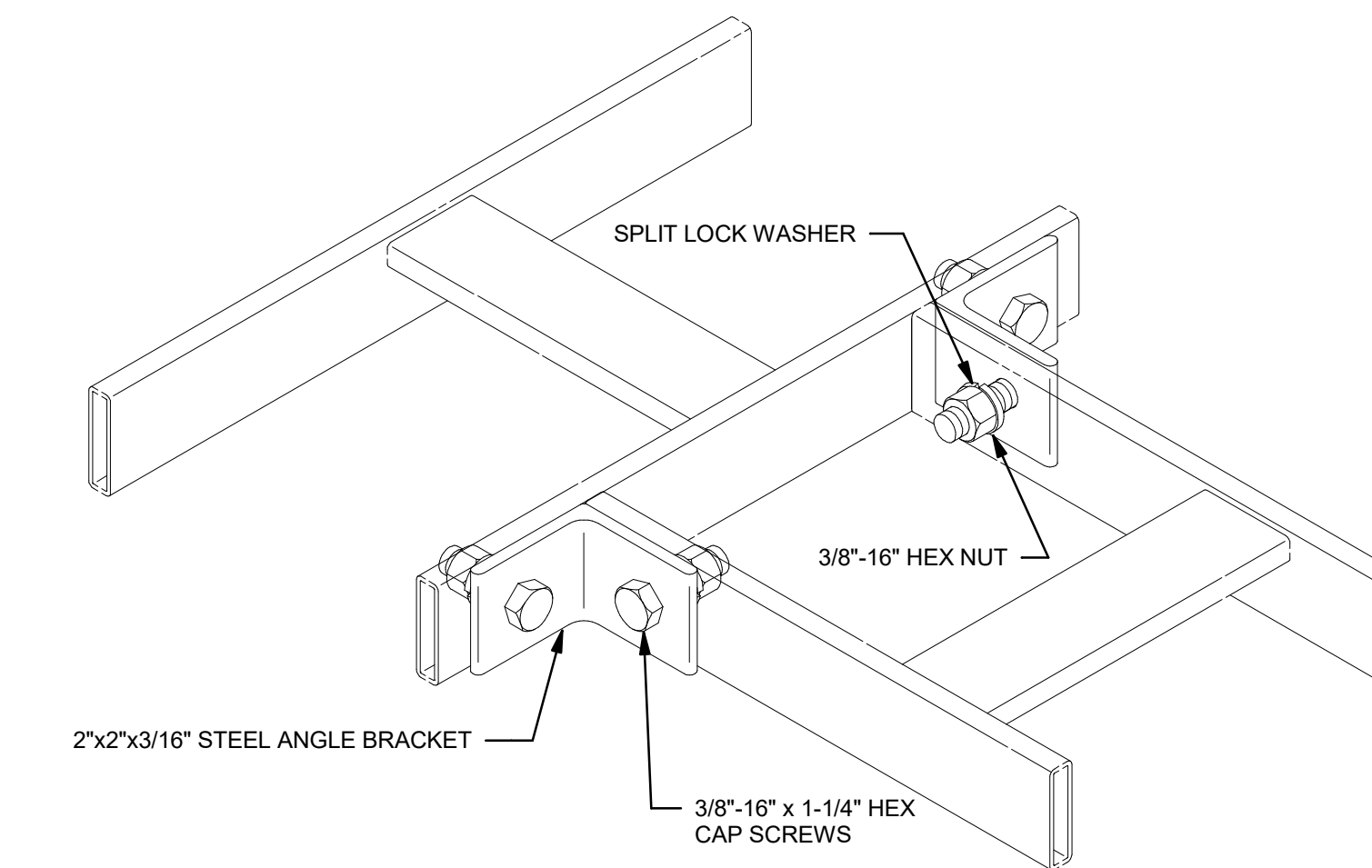
4 CABLE RUNWAY SPLICE KIT DETAIL
NO SCALE



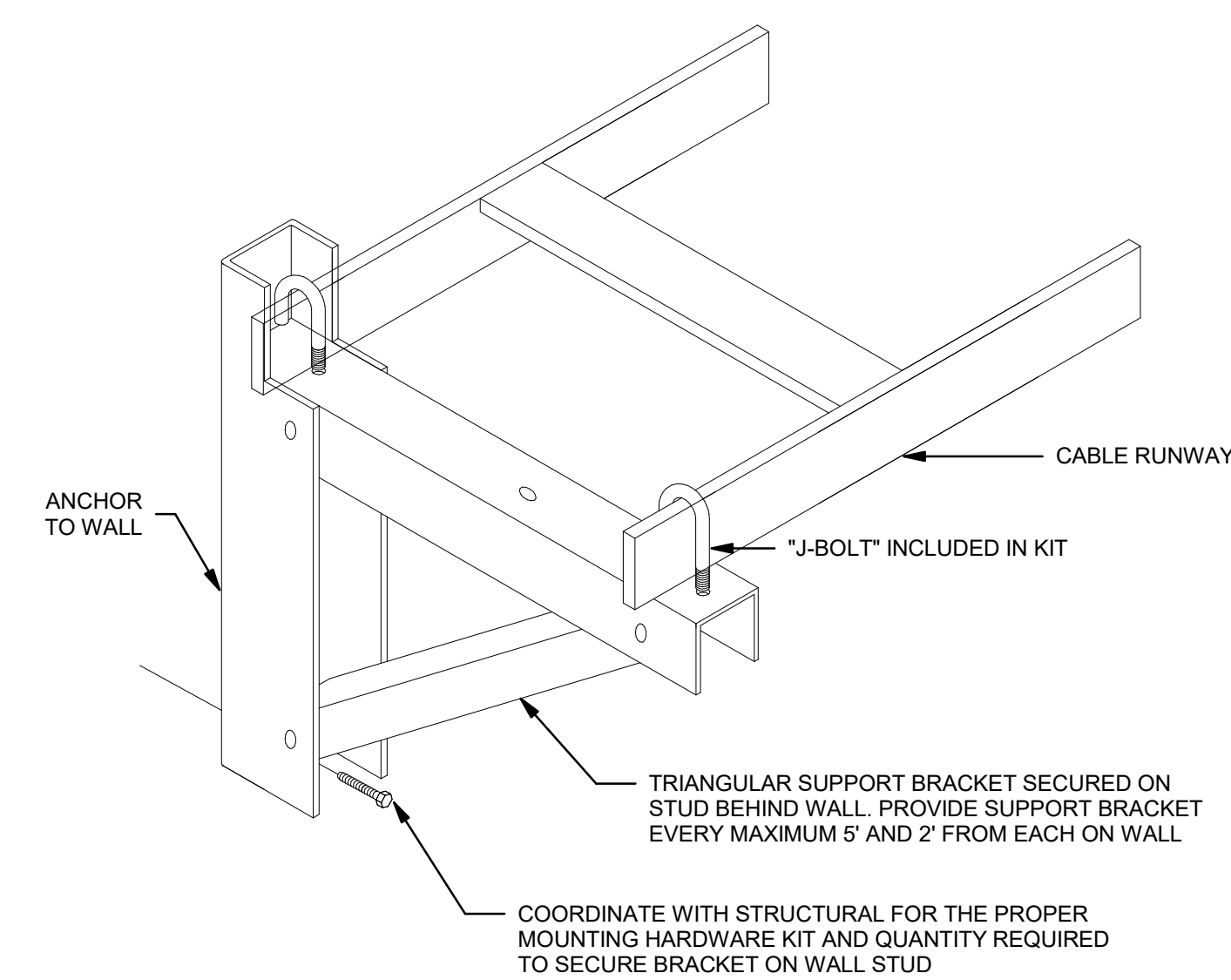
7 CABLE RUNWAY RADIUS DROP DETAILS
NO SCALE



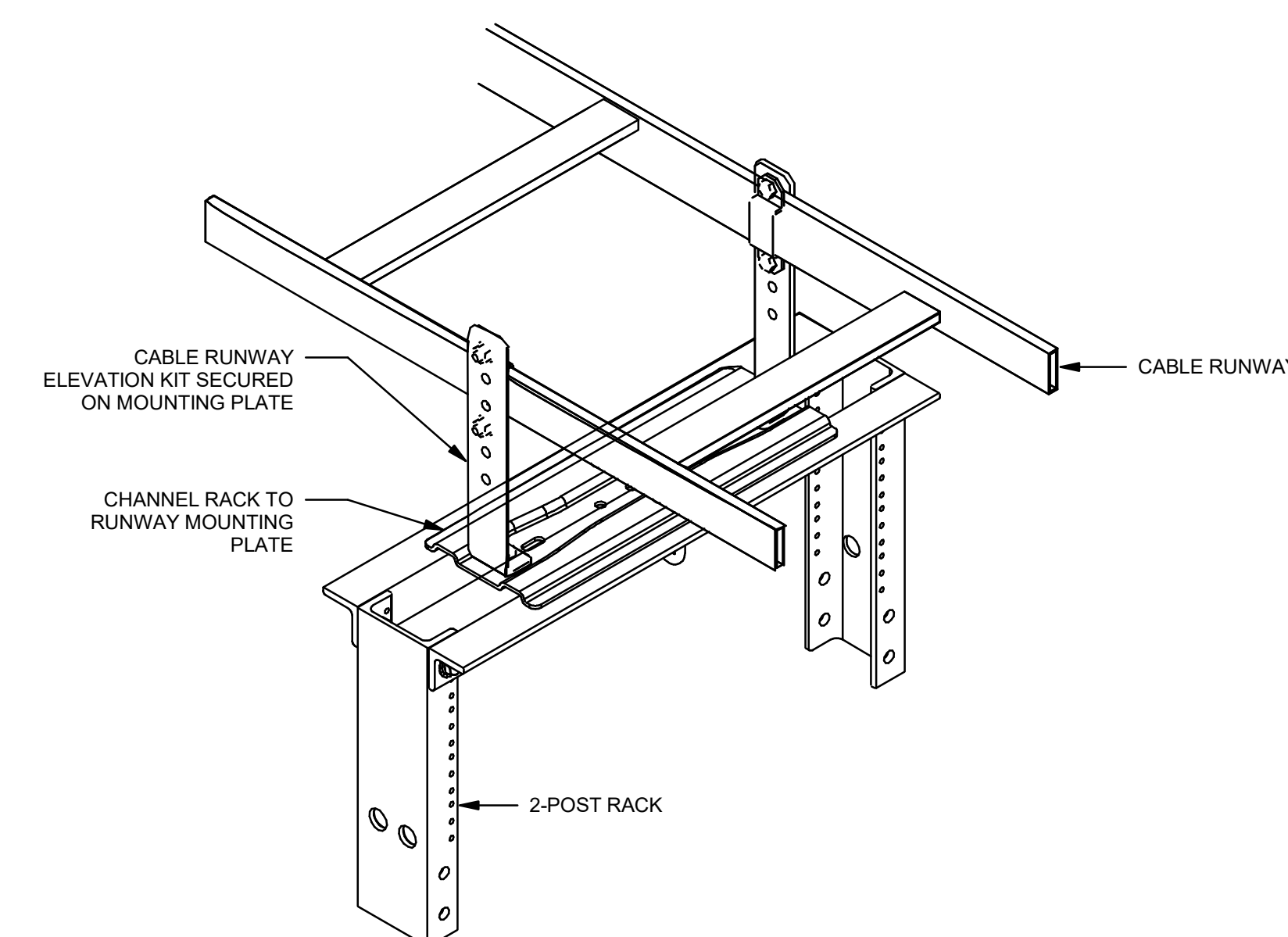
2 CABLE RUNWAY WALL ANGLE BRACKET DETAIL
NO SCALE



5 CABLE RUNWAY JUNCTION SPLICE KIT DETAIL
NO SCALE



3 CABLE RUNWAY TRIANGULAR SUPPORT DETAIL
NO SCALE



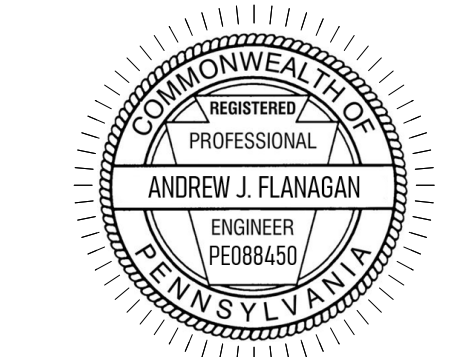
6 CABLE RUNWAY ABOVE 2-POST RACK DETAIL
NO SCALE

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
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 1818 Market St #3300, Philadelphia, PA 19103
 VERTICAL TRANSPORT
Michael Blades & Associates Ltd.
 5409 Rapidan Ct, Lothian, MD 20711
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Patricia Hord Graphik Design
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AECOM
 1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1	8 JUN 2023	ADDENDUM 25			

RECORD REVISIONS



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 250 Greenwich St, New York, 10007
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF GENERAL SERVICES
 HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No. **C-0211-0005 PHASE 5**
Pennsylvania State Police Academy
 Core Buildings, BESO & Sitework
 PENNSYLVANIA STATE POLICE
 HERSHEY, DAUPHIN COUNTY, PA



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

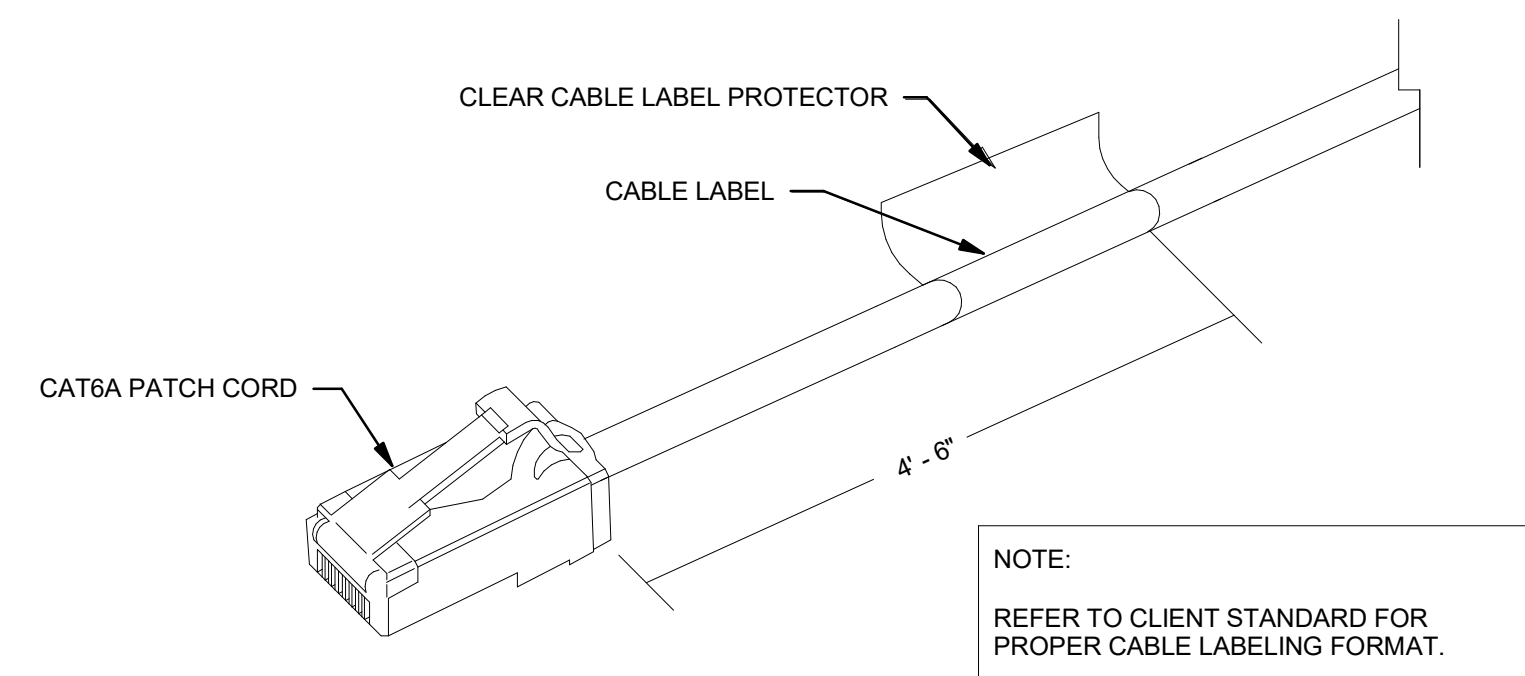
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CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

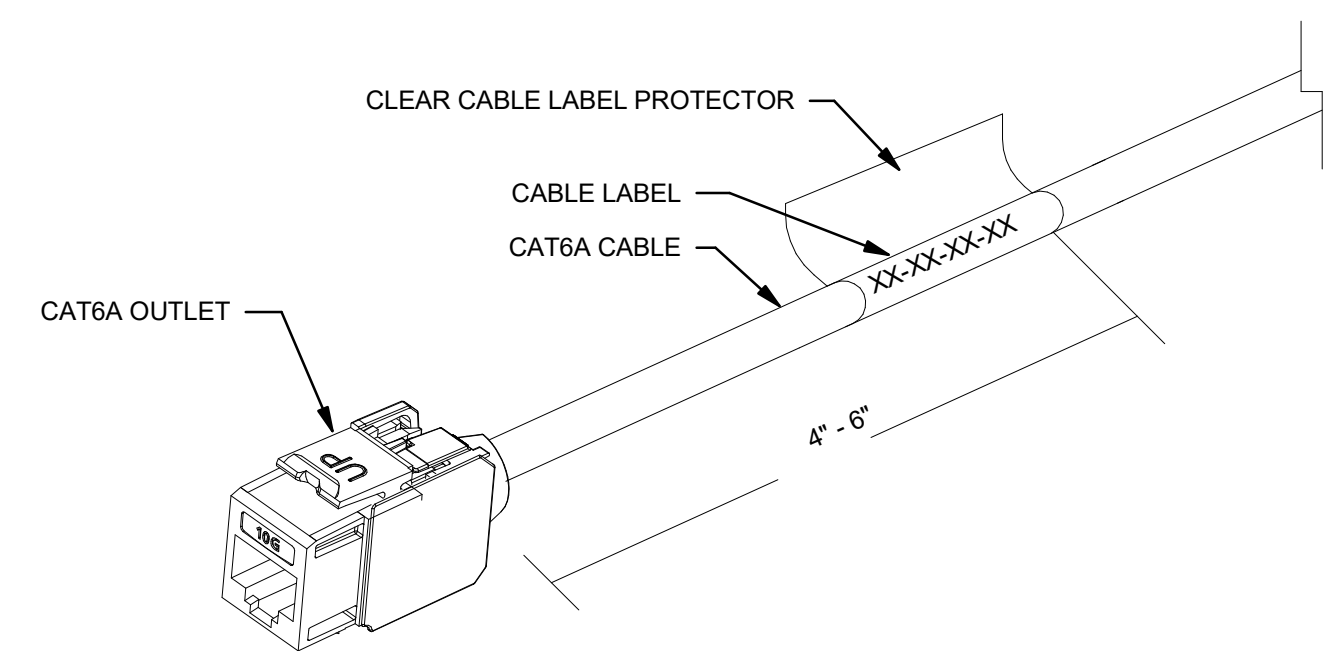
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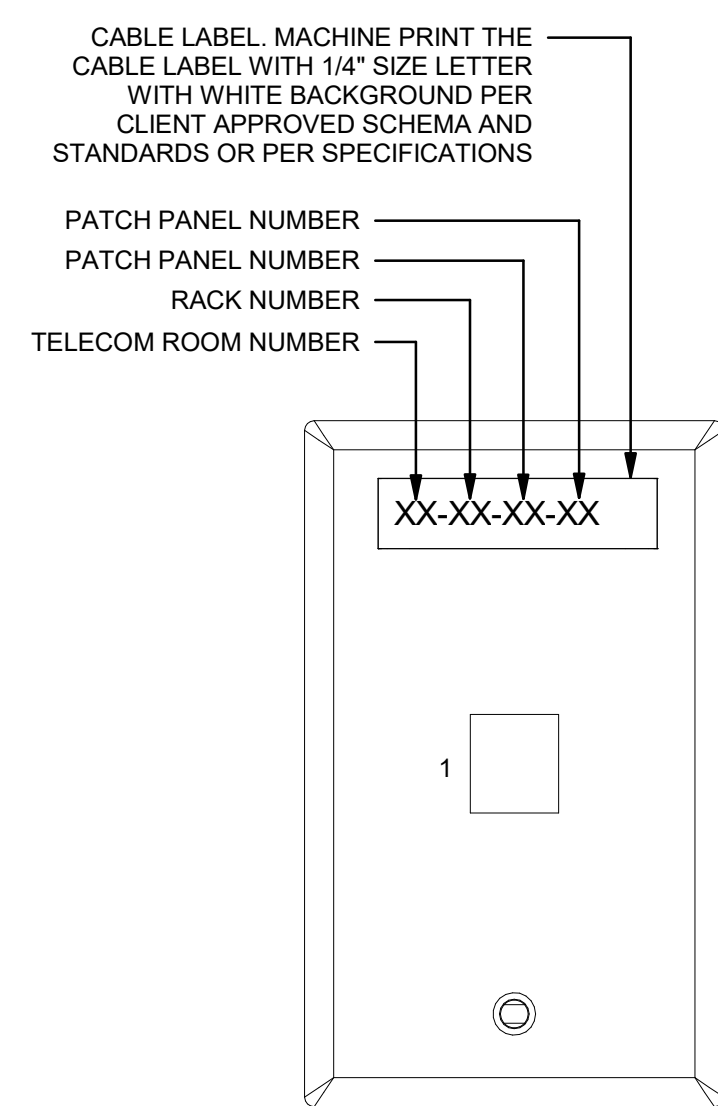
1 PATCH CORD LABELING DETAIL

NO SCALE



2 STATION CABLE LABELING DETAIL

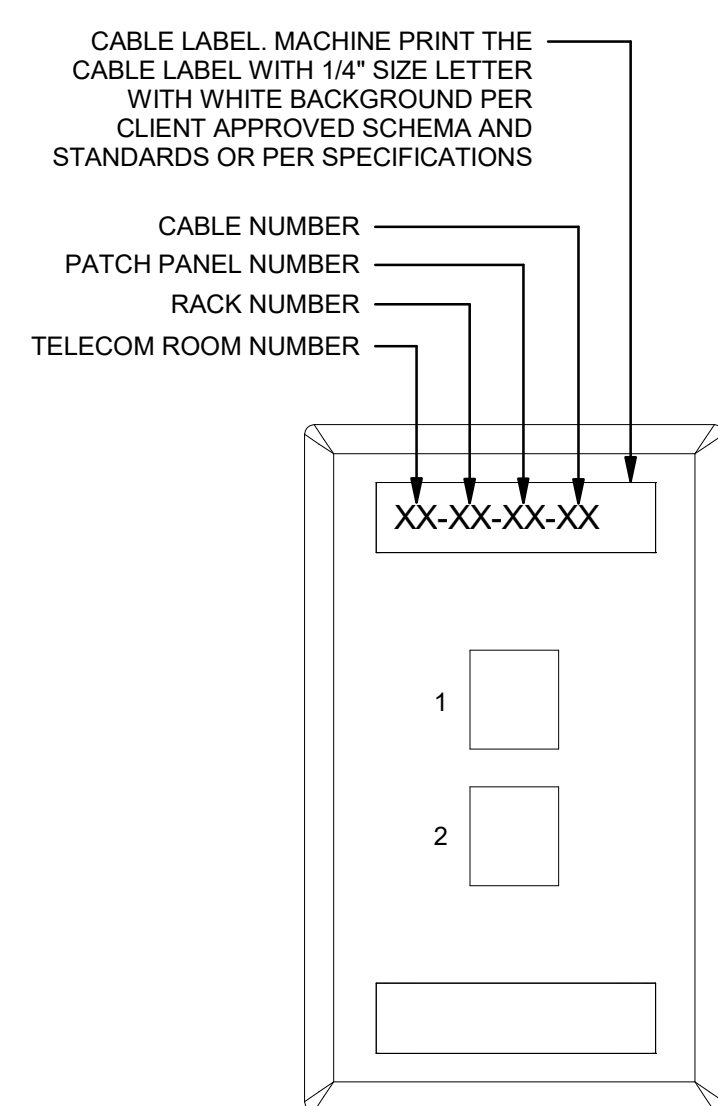
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NOTE:
REFER TO CLIENT'S STANDARD FOR PROPER DATA PORT IDENTIFICATION LABELING

3 ONE-PORT FACEPLATE DETAIL

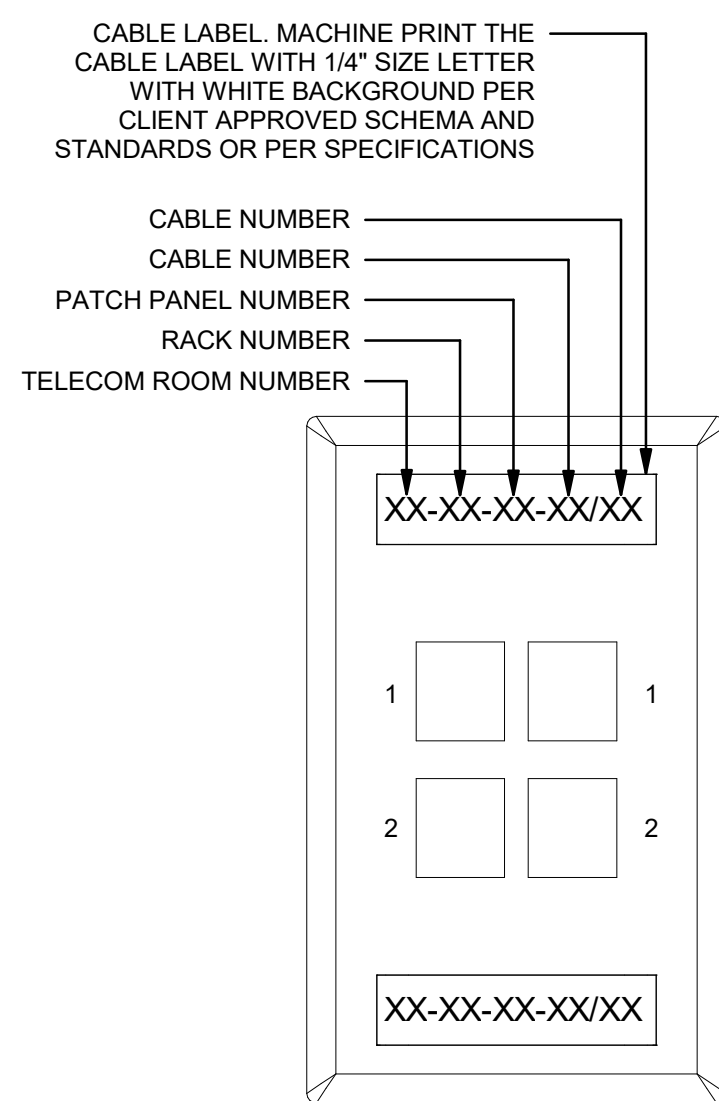
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NOTE:
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4 TWO-PORT FACEPLATE DETAIL

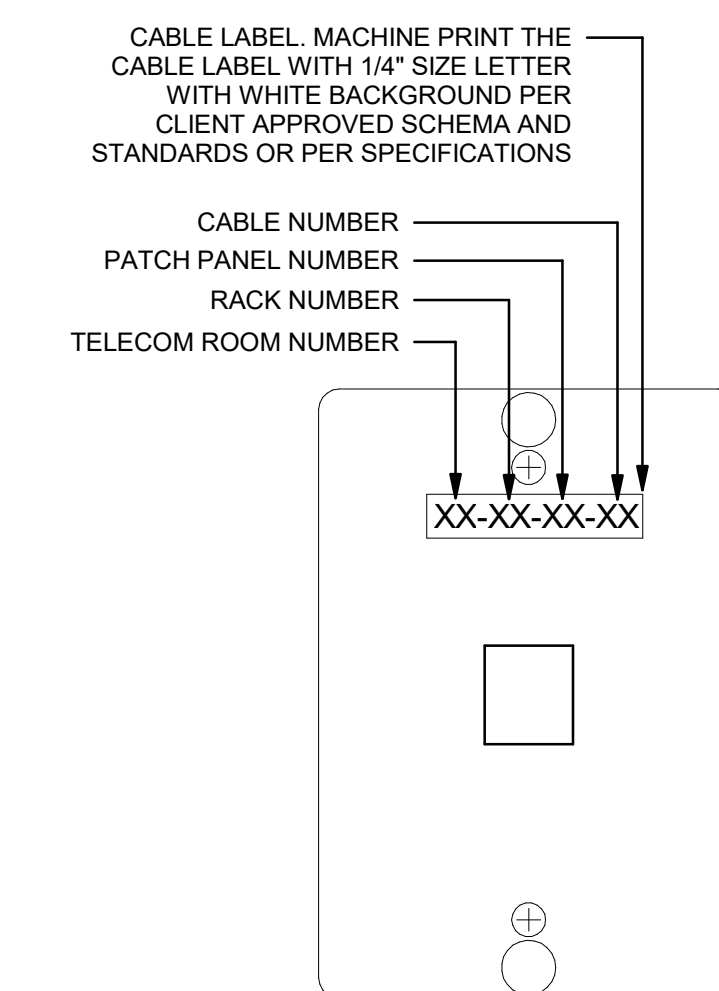
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NOTE:
REFER TO CLIENT'S STANDARD FOR PROPER FACEPLATE LABEL DETAIL

5 FOUR-PORT FACEPLATE DETAIL

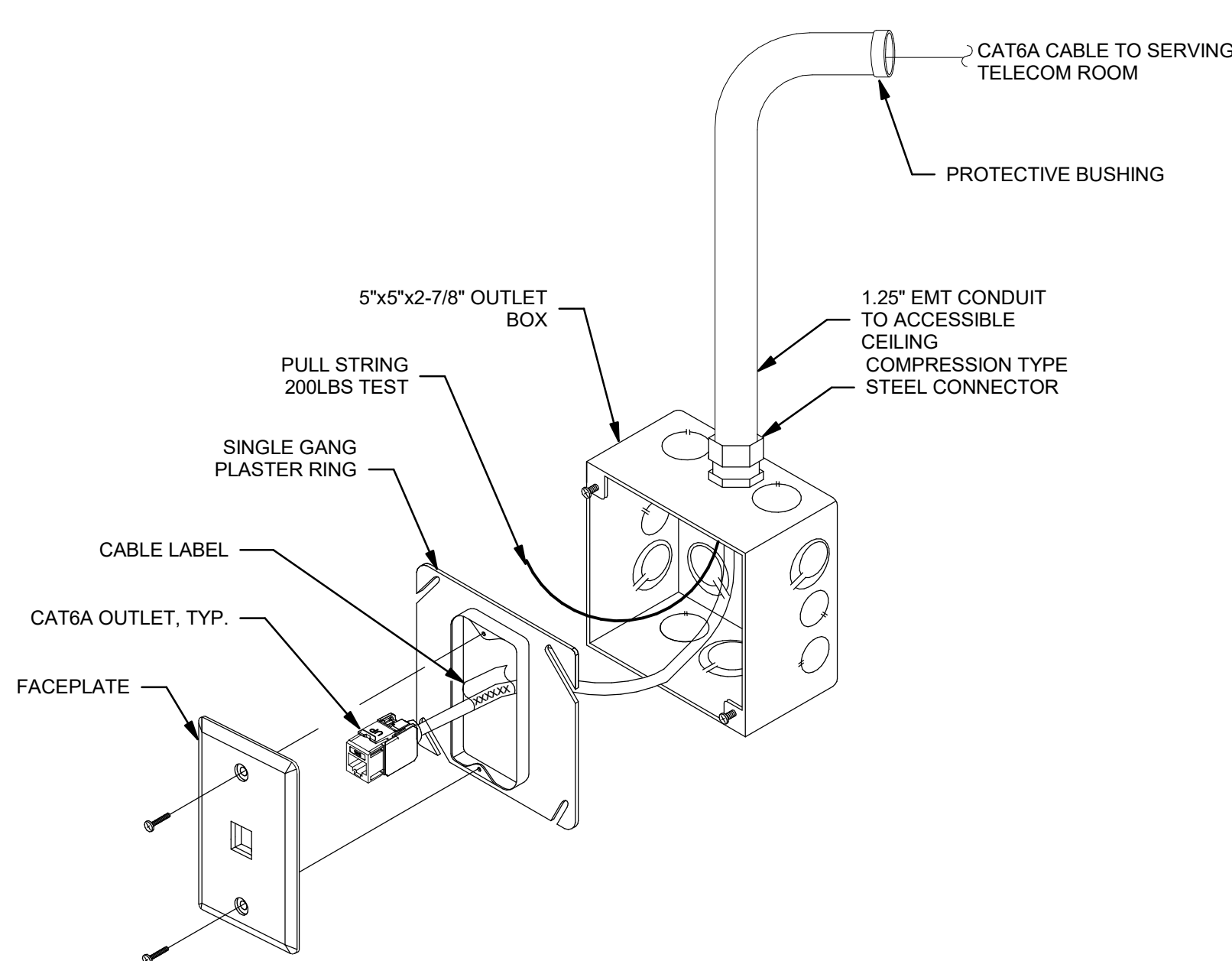
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NOTE:
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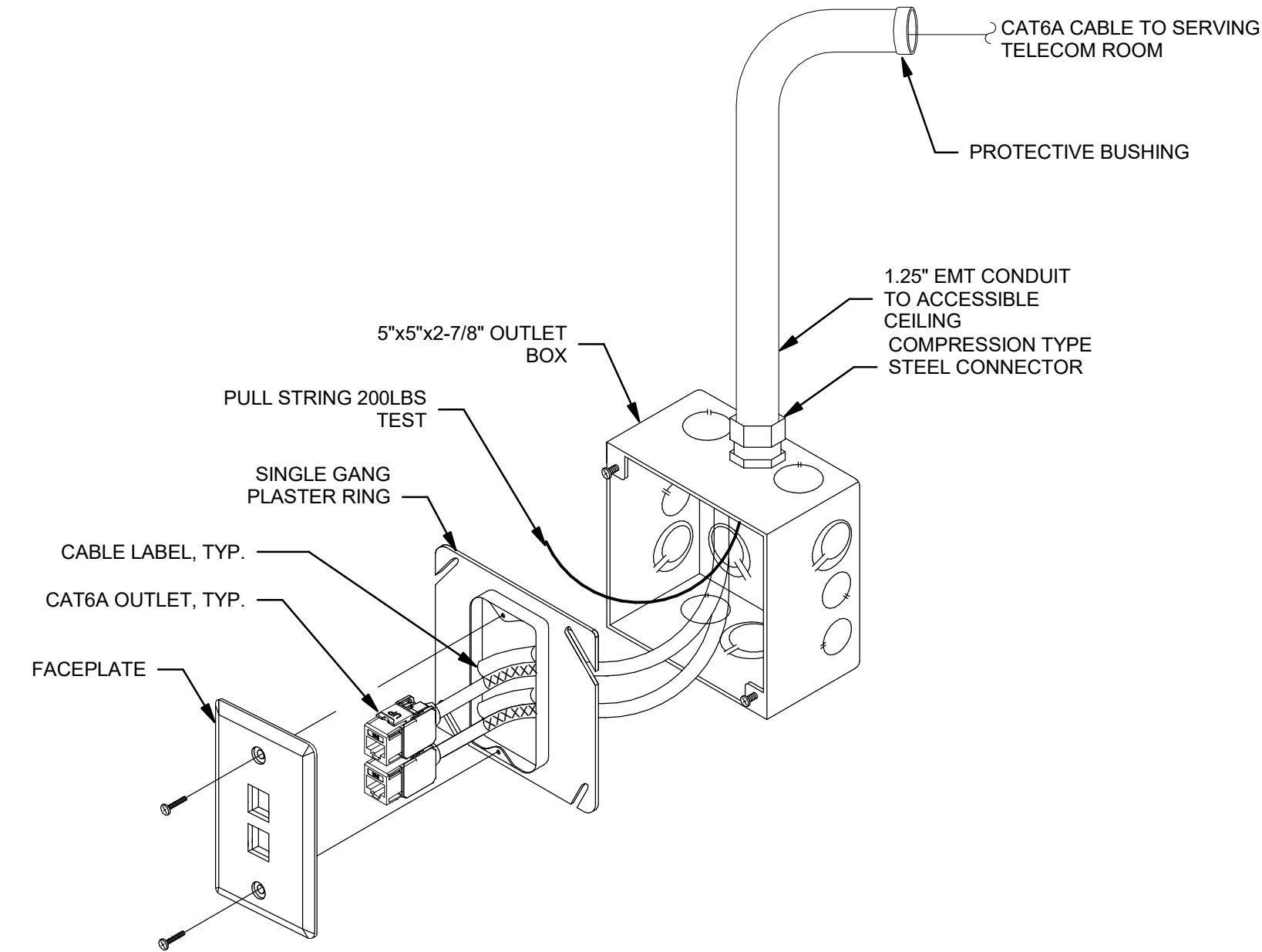
6 WALL PHONE FACE PLATE DETAIL

NO SCALE



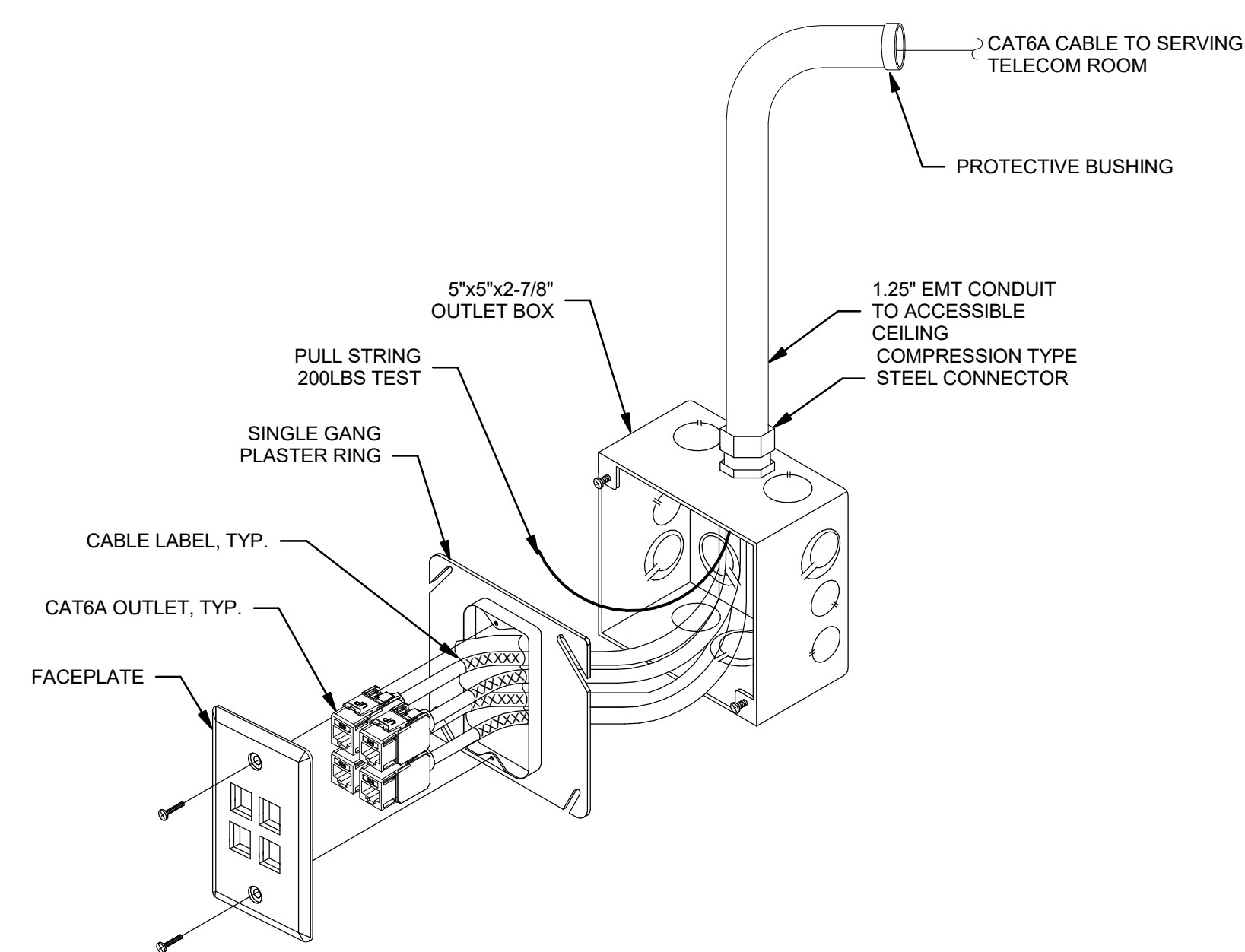
7 DATA OUTLET - ONE PORT - DETAIL

NO SCALE



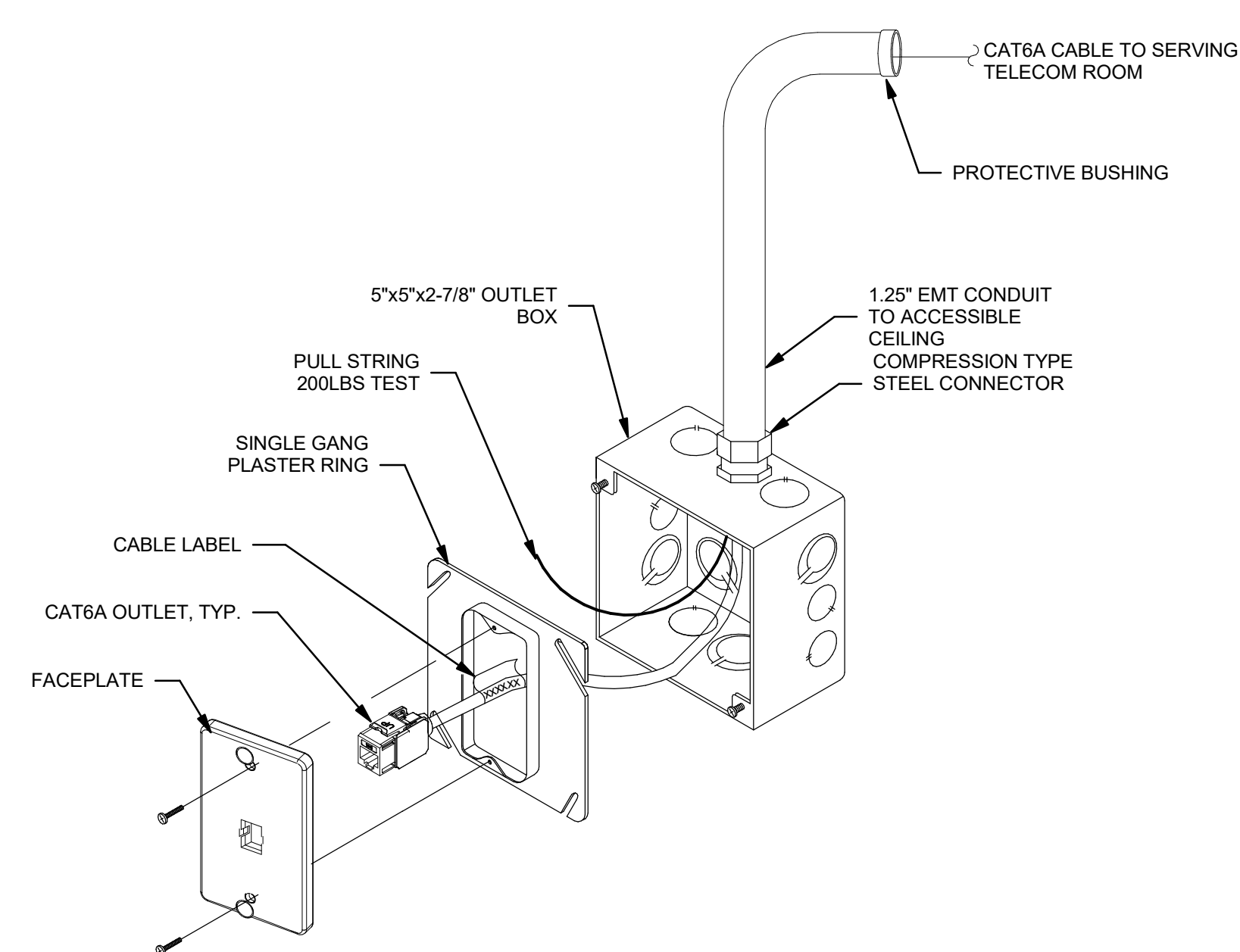
8 DATA OUTLET - TWO PORT - DETAIL

NO SCALE



9 DATA OUTLET - FOUR PORT - DETAIL

NO SCALE



10 WALL PHONE OUTLET DETAIL

NO SCALE

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

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250 Greenwich St, New York, NY 10007

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2000 M Street NW, Suite 270, Washington, DC 20036

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CIVIL ENGINEER

Langan
1818 Market St #3300, Philadelphia, PA 19103

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5409 Rapidan Ct, Lothian, MD 20711

SINAGE 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

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1000 Patomac St NW, Suite 121, Washington, DC 20007

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7906 MacArthur Blvd, Suite 100, Cabin John, MD 20818

POOL DESIGN

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
1					
2					
3					
4	8 JUN 2023	ADDENDUM 25			

SIGNATURE: *AF* DATE: 6/9/2023

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

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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

DETAILS - TELECOMMUNICATIONS

SHEET No. **GEN-TC-705**

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INTERFACE ENGINEERING

PROJECT: 2021-0159
CONTACT: Robert Gannon
2000 M Street NW, Suite 270
Washington, DC 20036
TEL: 202-370-9555
www.interfaceengineering.com

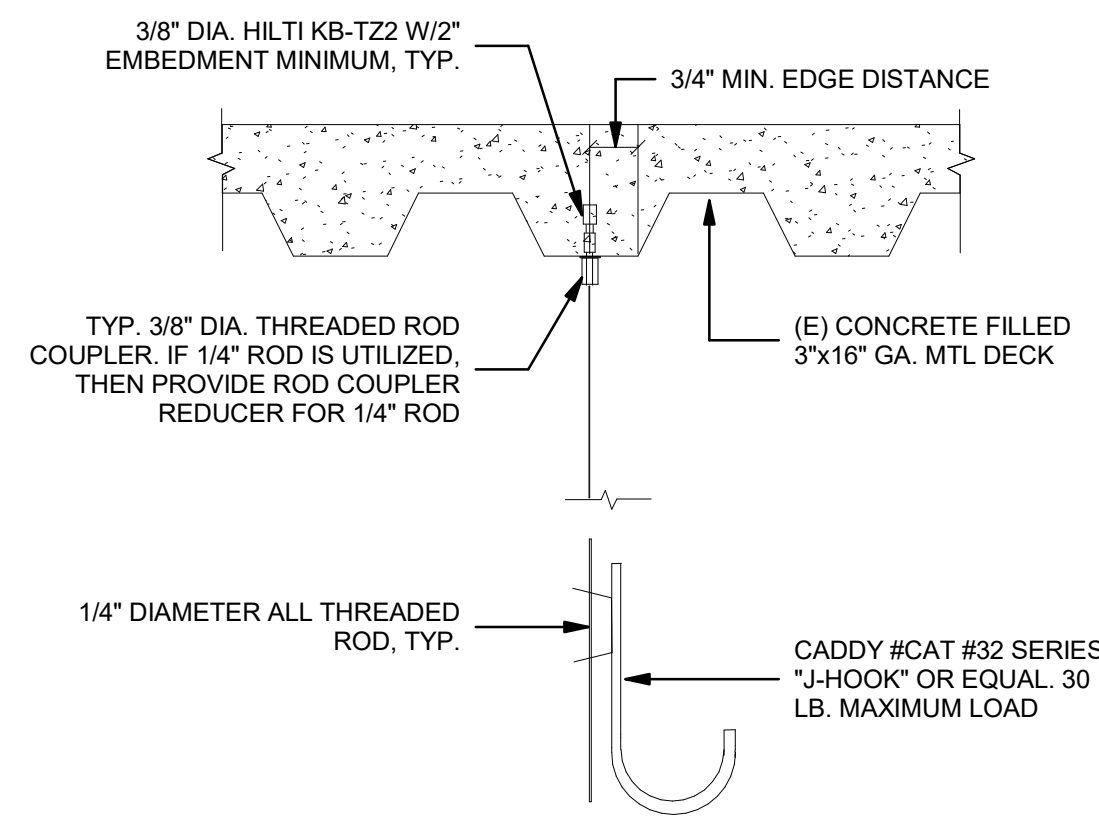
VERIFY SCALE

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

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

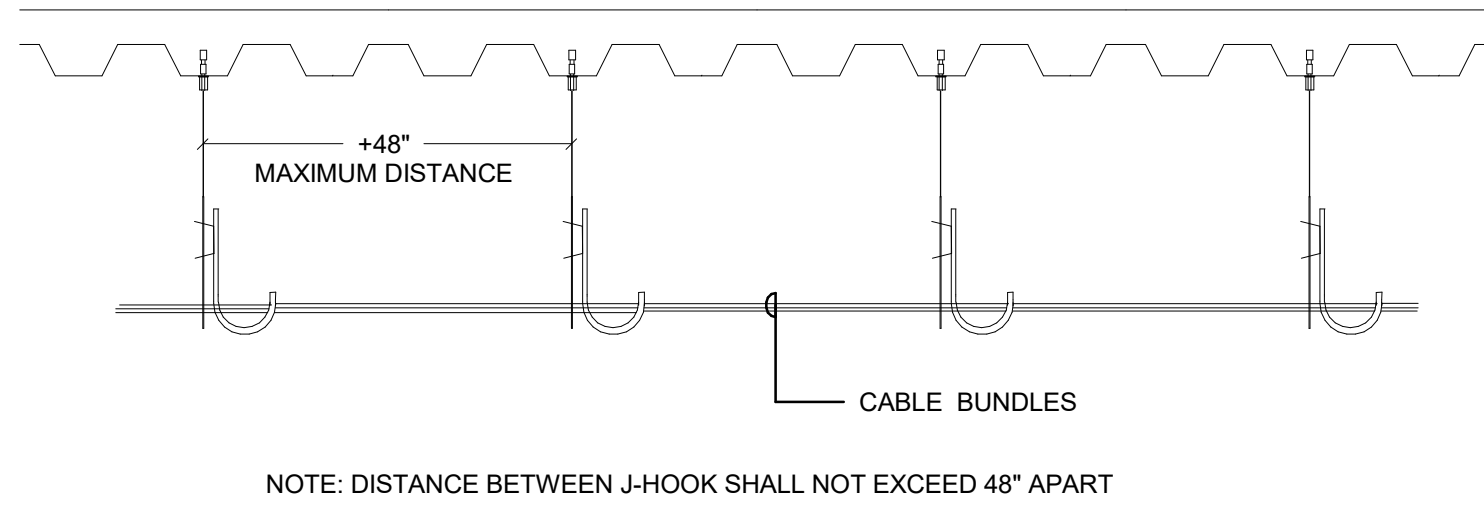
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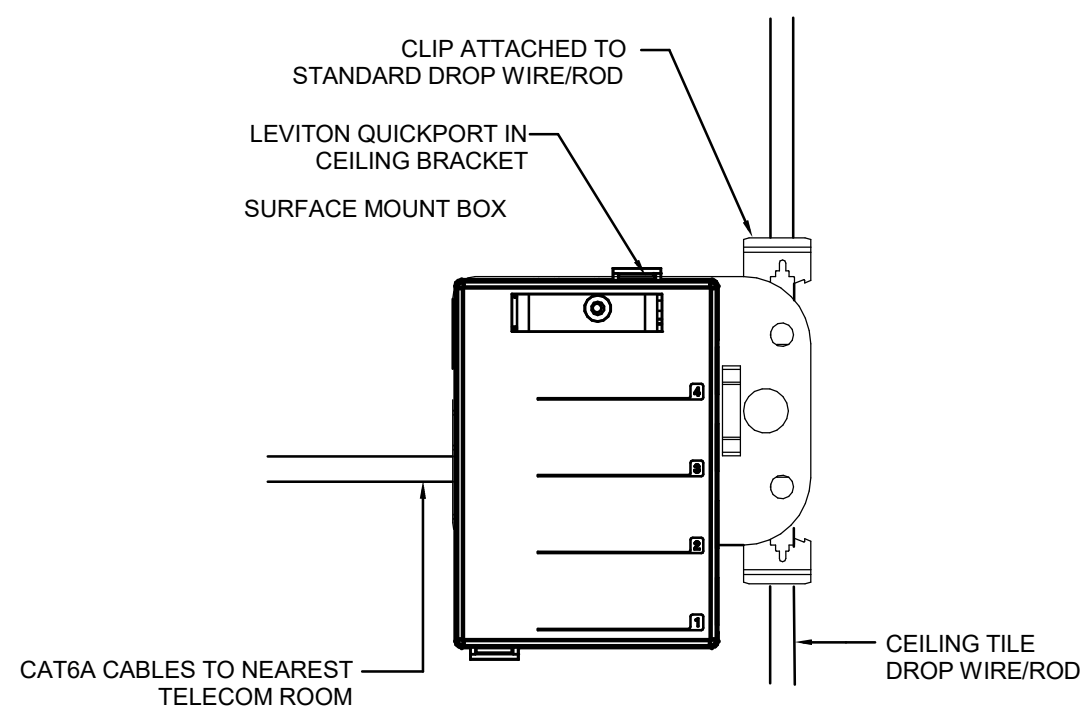
1 J-HOOK PATHWAY DETAIL

NO SCALE



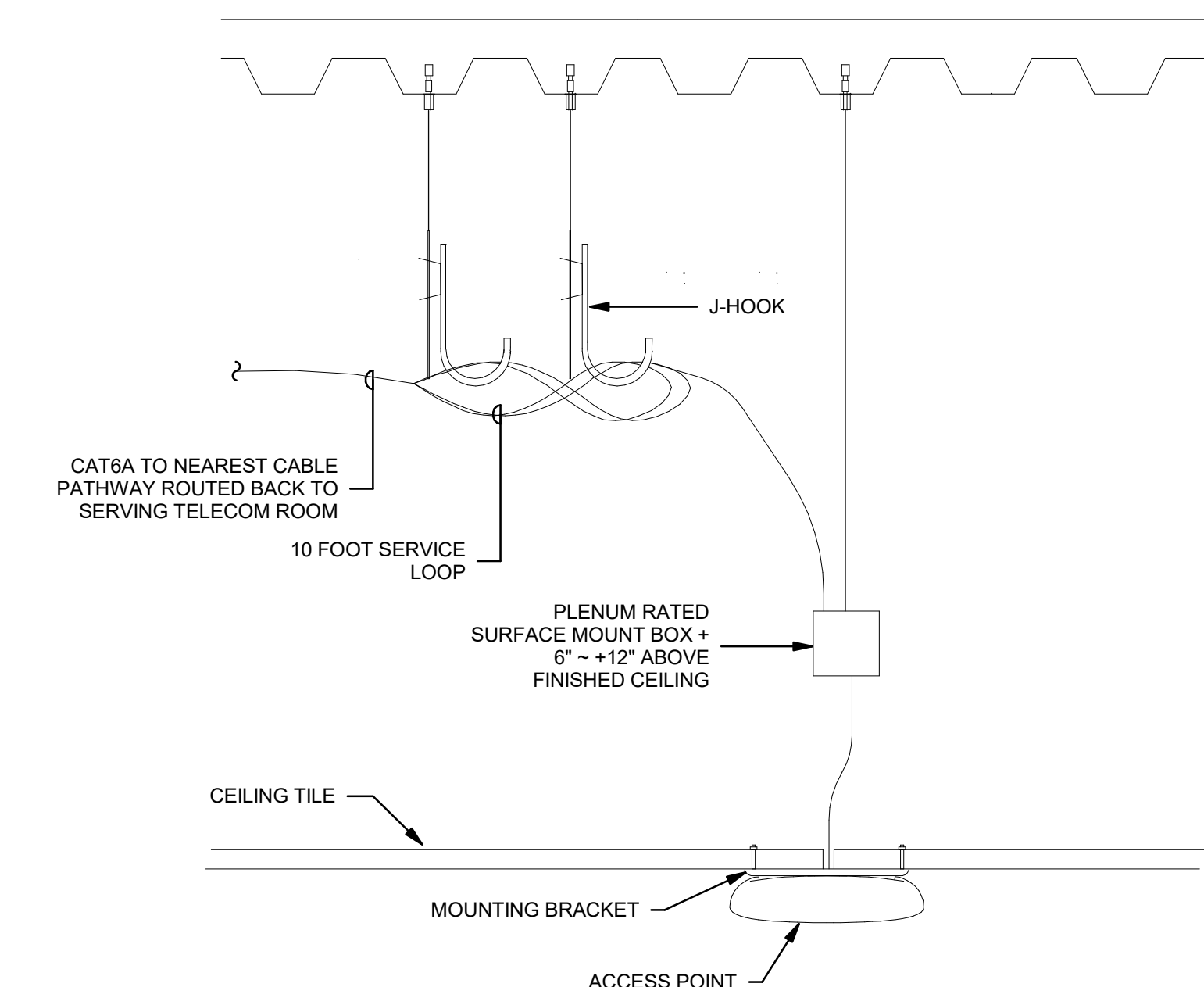
2 2-PORT SURFACE MOUNTBOX DETAIL

NO SCALE



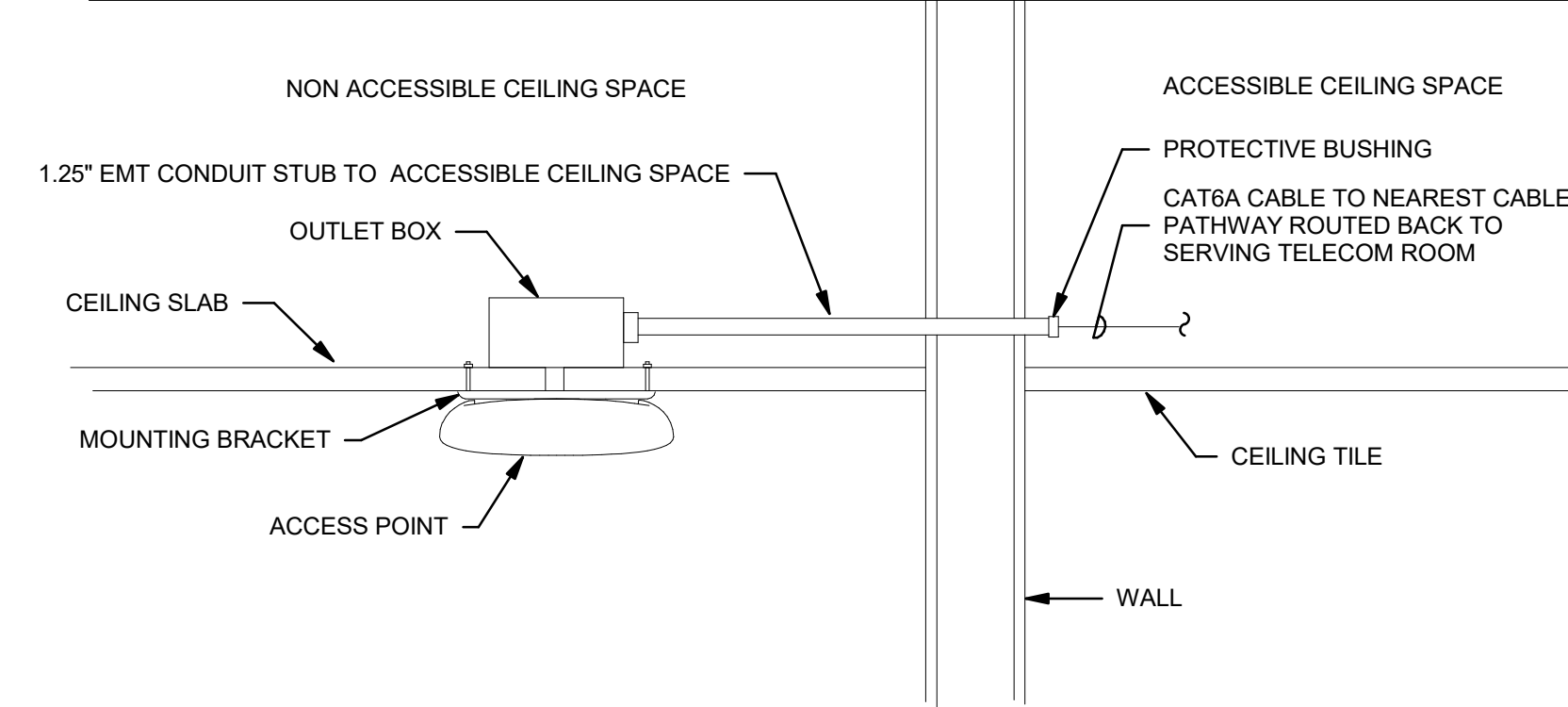
3 4-PORT SURFACE MOUNTBOX DETAIL

NO SCALE



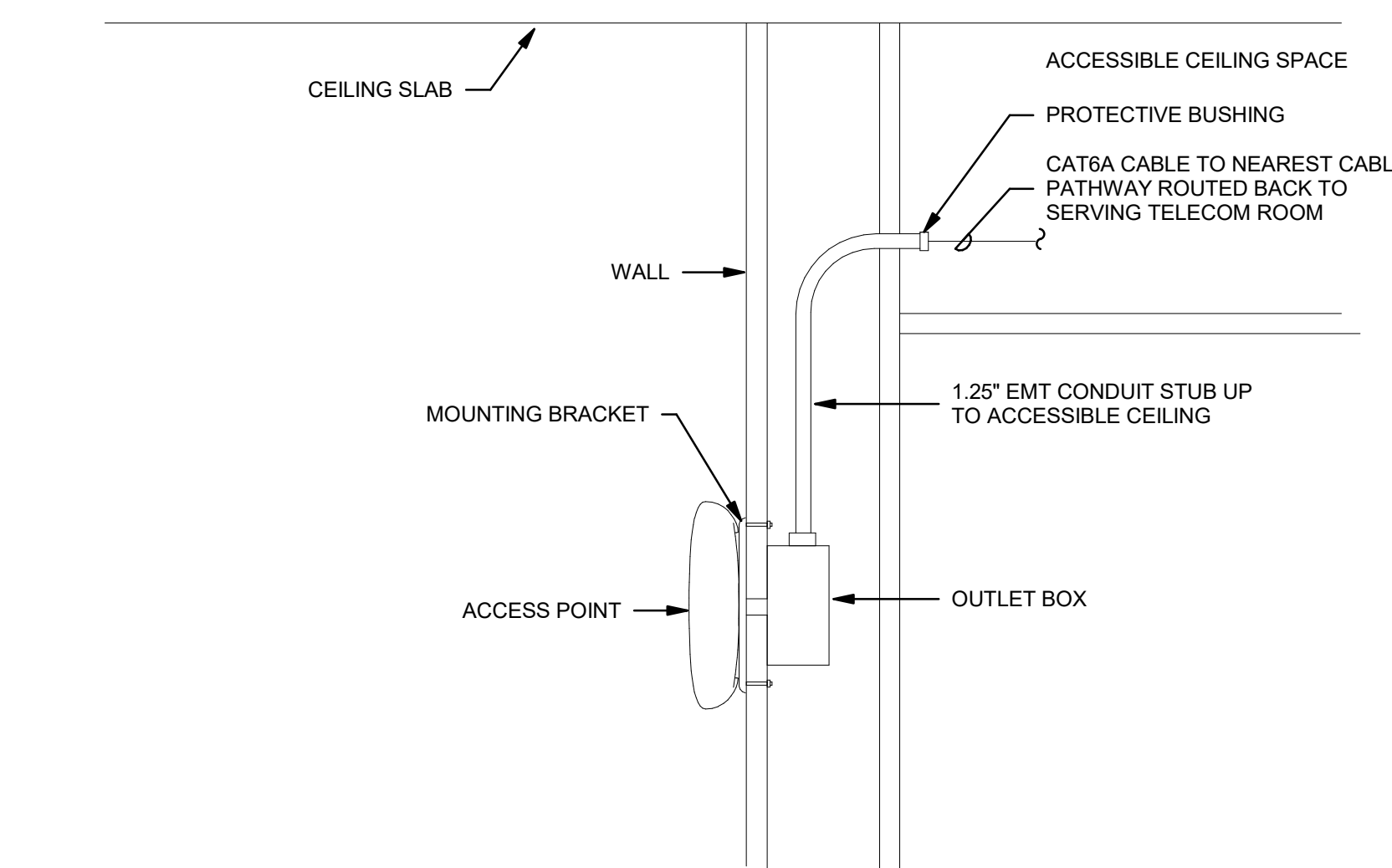
4 CEILING ACCESS POINT DETAIL

NO SCALE



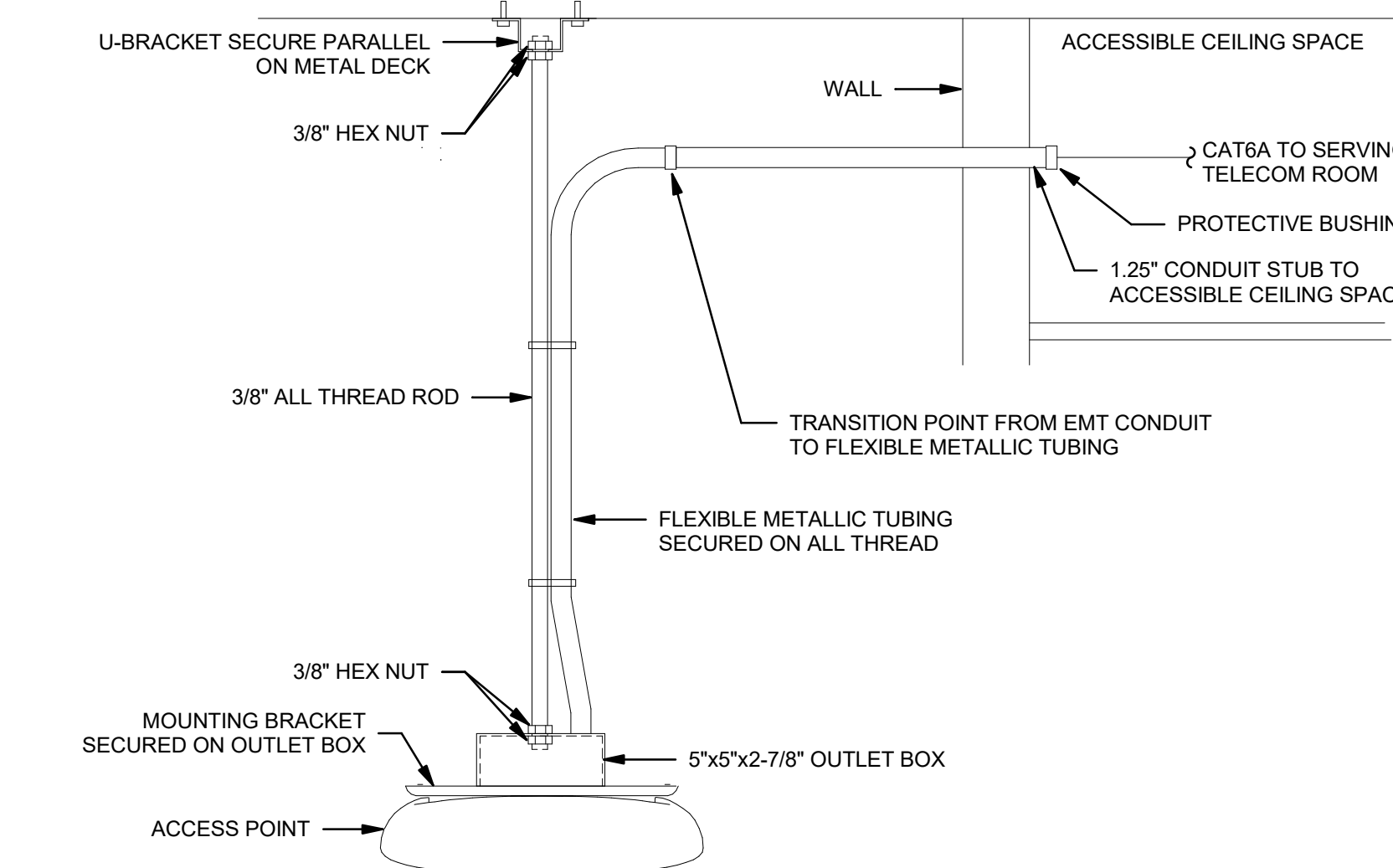
5 HARD LID CEILING MOUNT ACCESS POINT DETAIL

NO SCALE



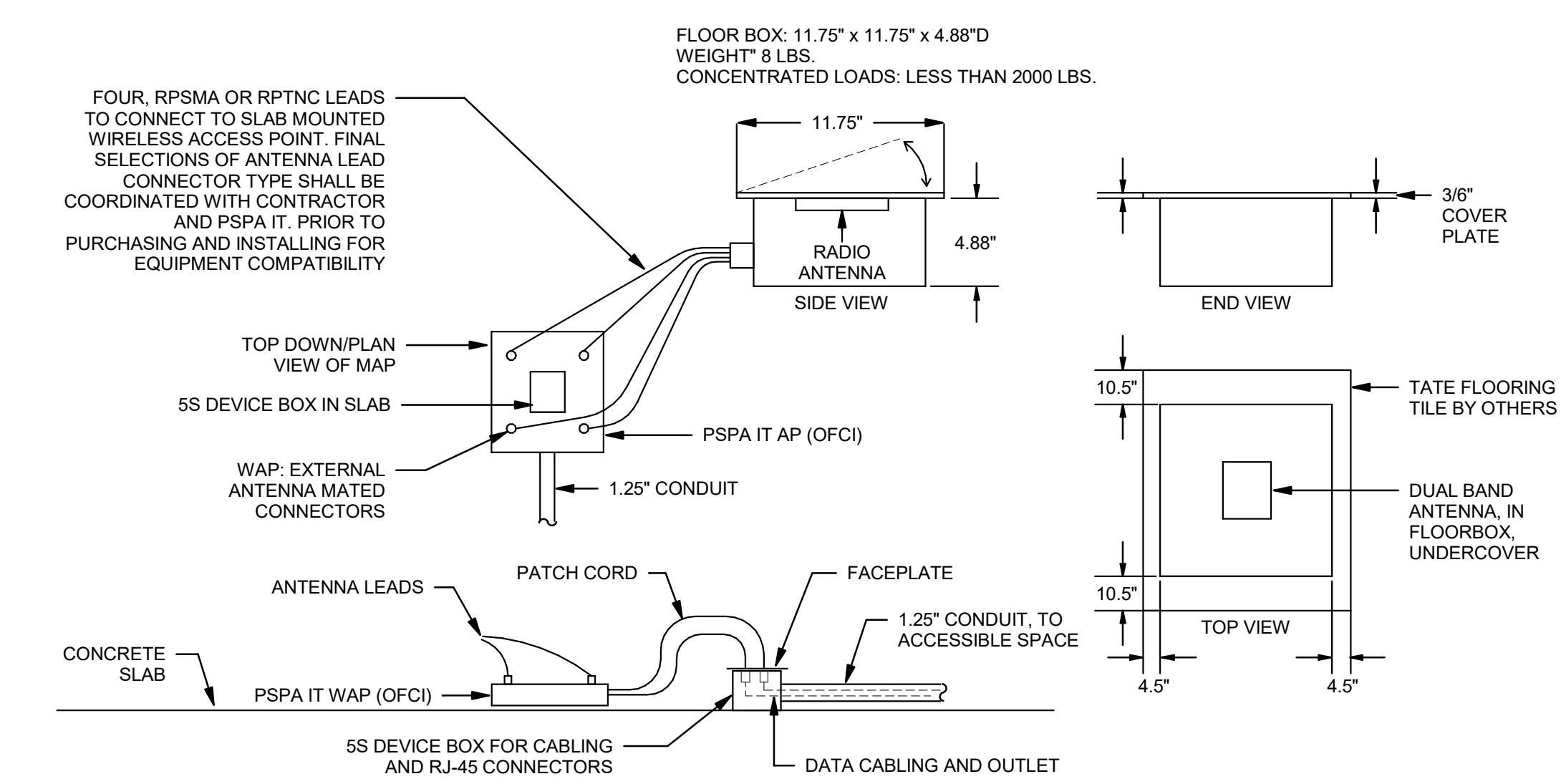
6 WALL MOUNT ACCESS POINT DETAIL

NO SCALE



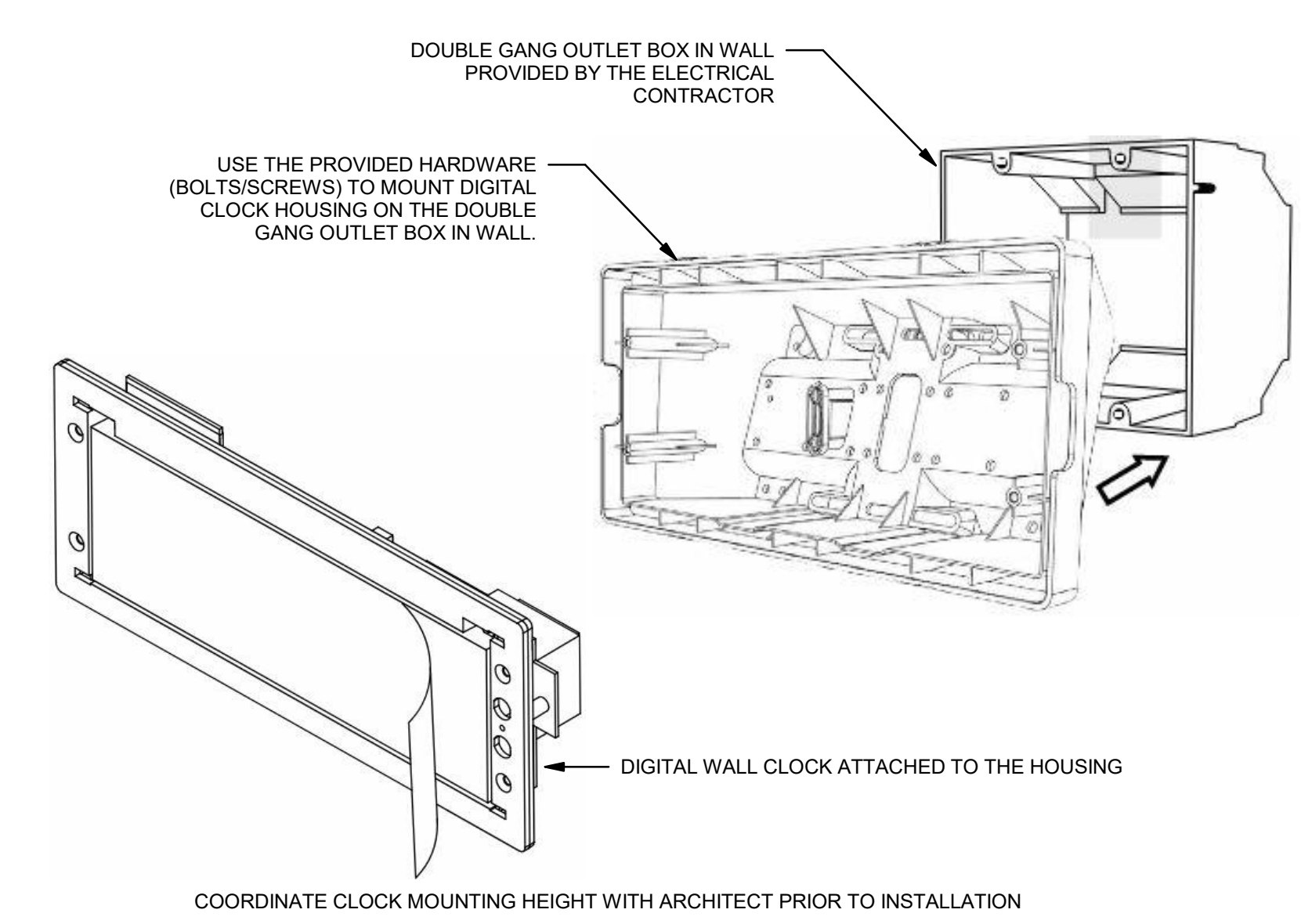
7 PENDANT MOUNT ACCESS POINT DETAIL

NO SCALE



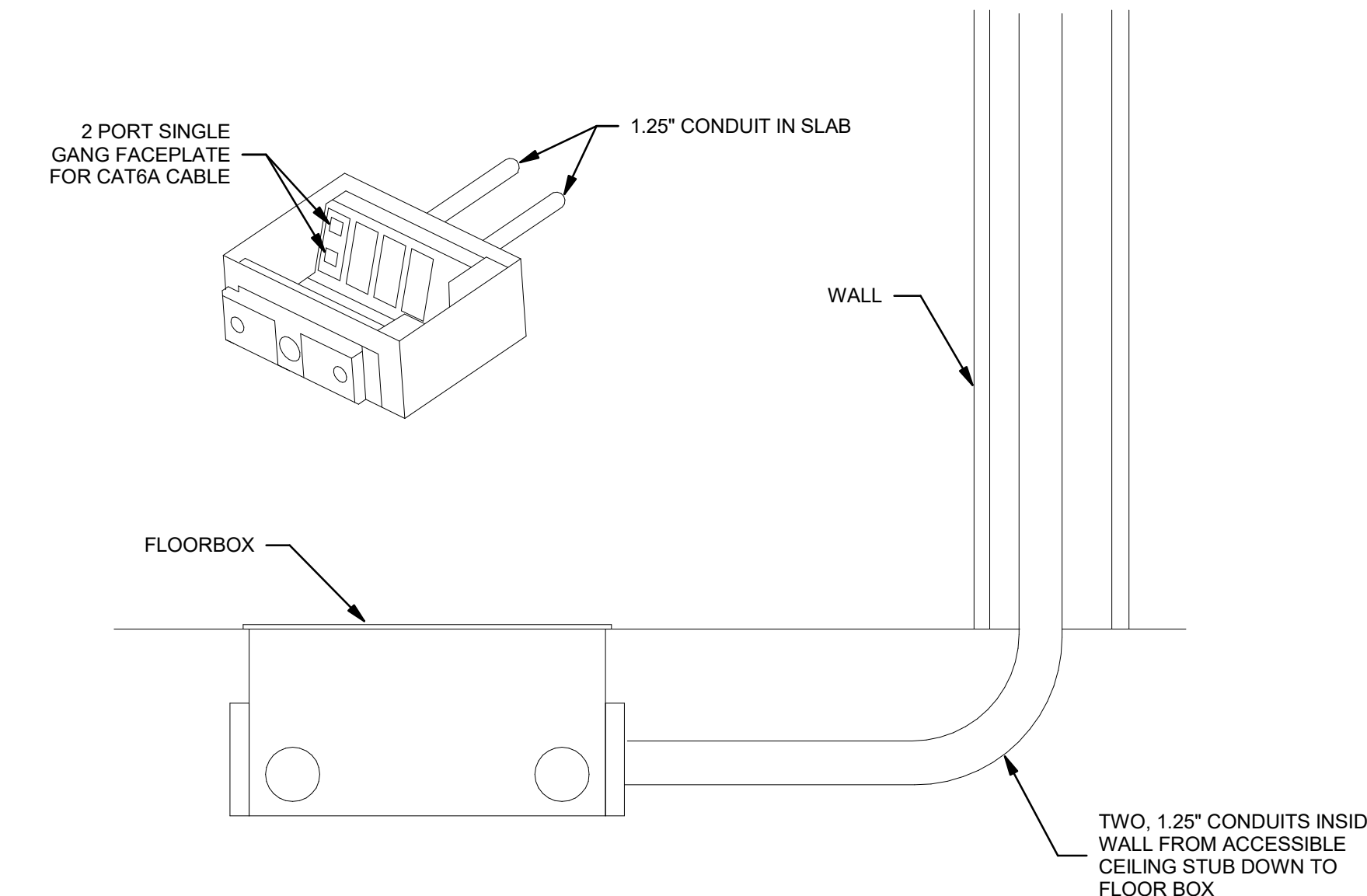
8 IN FLOOR WIRELESS ACCESS POINT DETAIL

NO SCALE



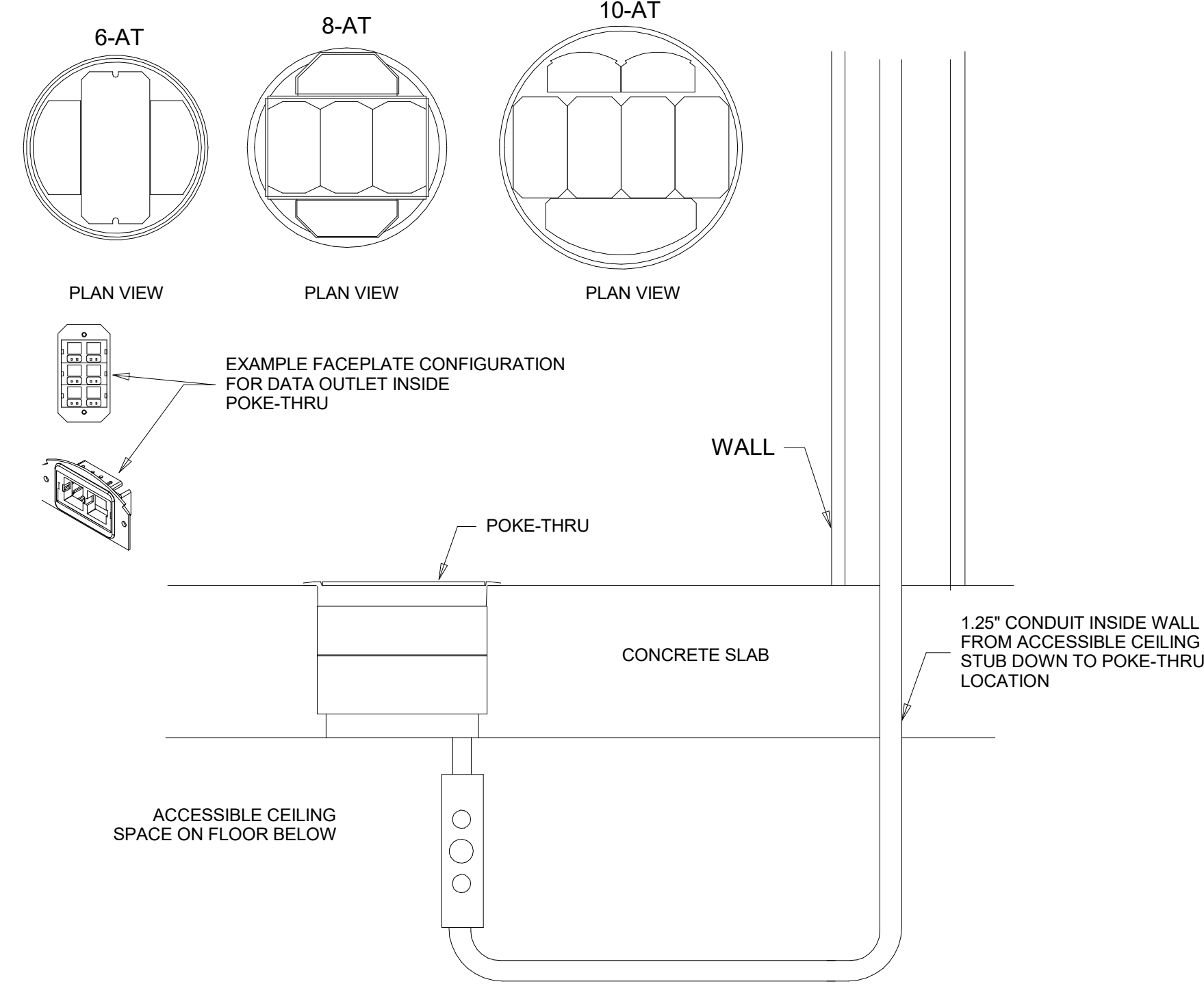
9 WIRELESS NETWORK CLOCK MOUNTING DETAIL

NO SCALE



10 IN SLAB FLOOR BOX DETAIL

NO SCALE



11 TYPICAL POKE-THRU DETAIL

NO SCALE

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

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POOL DESIGN

AECOM
1700 Market St, Suite 1600, Philadelphia, PA 19103

KEY PLAN

NO	DATE	DESCRIPTION	NO	DATE	DESCRIPTION
1			2		
3			4		
5			6		
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95			96		
97			98		
99			100		

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

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C-0211-0005 PHASE 5
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Core Buildings, BESO & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

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

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

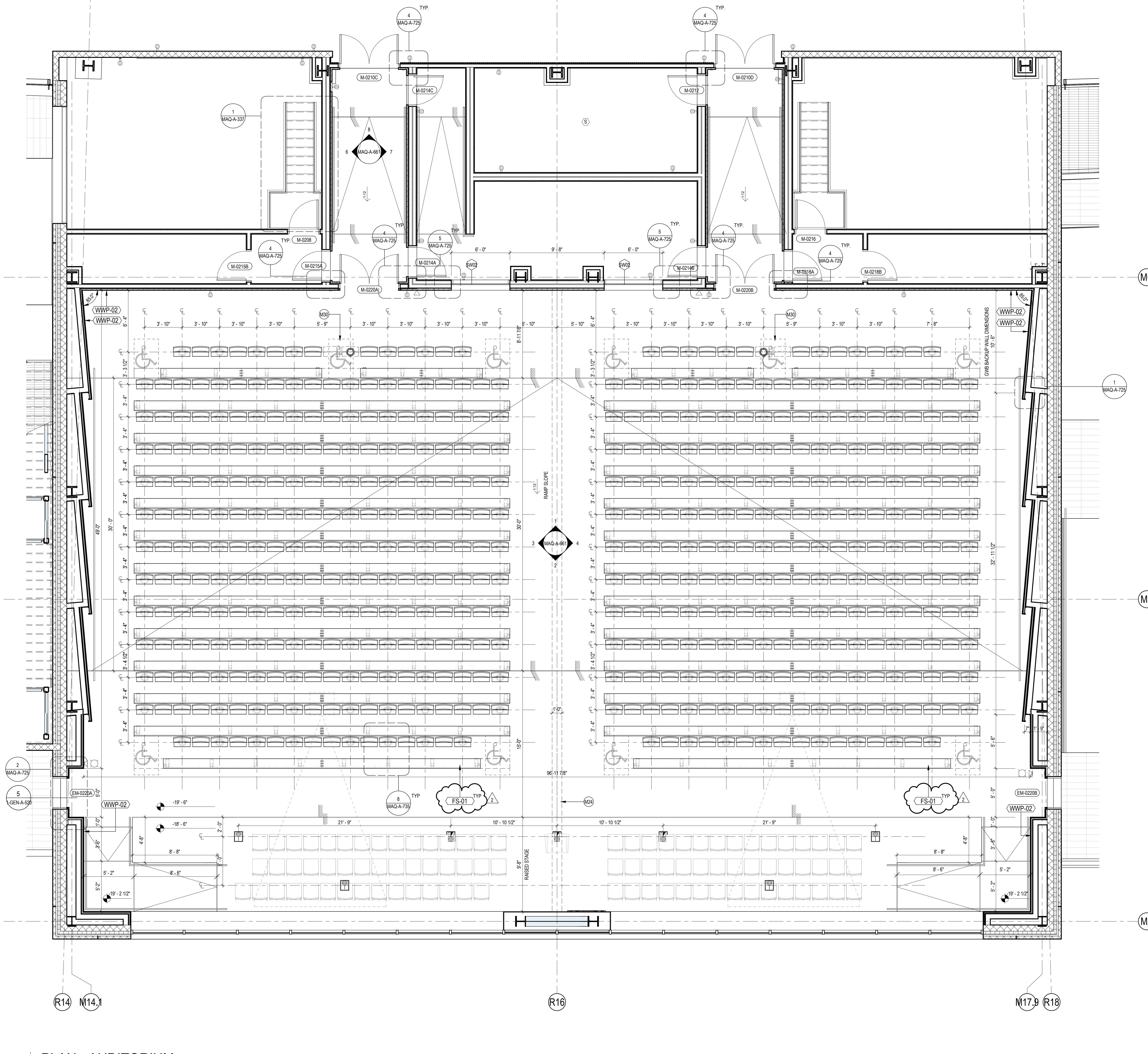
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

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

SHEET No. **GEN-TC-706**

DRAWN BY: AD
CHECKED BY: MT
DATE: []
SCALE: AS NOTED

PLOTTED BY: Xian Chi
PLOTTED: 2023.05.21 01:10 PM
FILE PATH: B:\806
LAST SAVED: 2023.05.21 01:10 PM



LEGEND

FIRE RATINGS

- 1/2 HOUR FIRE RATING
- 1 HOUR FIRE RATING
- 2 HOUR FIRE RATING
- 3 HOUR FIRE RATING

DRAWING NOTE

1	SWITCH	SINGLE 1A	DOUBLE 1B	QUAD 1C	CONTROL 1D
2	ELECTRICAL OUTLET	SINGLE 2A	DOUBLE 2B	QUAD 2C	
3	DATA OUTLET	2 PORT 3A	6 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, FRIS, 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**
- M24 OPERABLE ACOUSTIC PARTITION
 - M30 REMOVABLE SEAT FOR ADDITIONAL ACCESSIBLE SEATING

KEYNOTES

FS-01	126100	AUDITORIUM FIXED SEATING AND TABLES
WWP-02	064000	WOOD WALL PANEL - PERFORATED

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION
2	09 JUNE 2023	ADDENDUM 25			
1	19 MAY 2023	ISSUED FOR BID			

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**
Pennsylvania State Police Academy
Core Buildings, BES0 & Sitework
PENNSYLVANIA STATE POLICE
HERSHEY, DAUPHIN COUNTY, PA

VERIFY SCALE

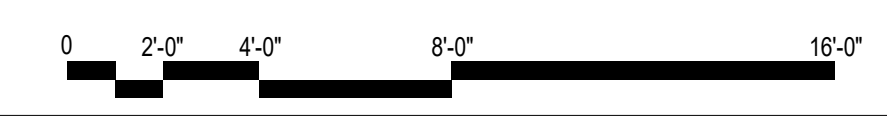
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ON ORIGINAL DRAWING: 1
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

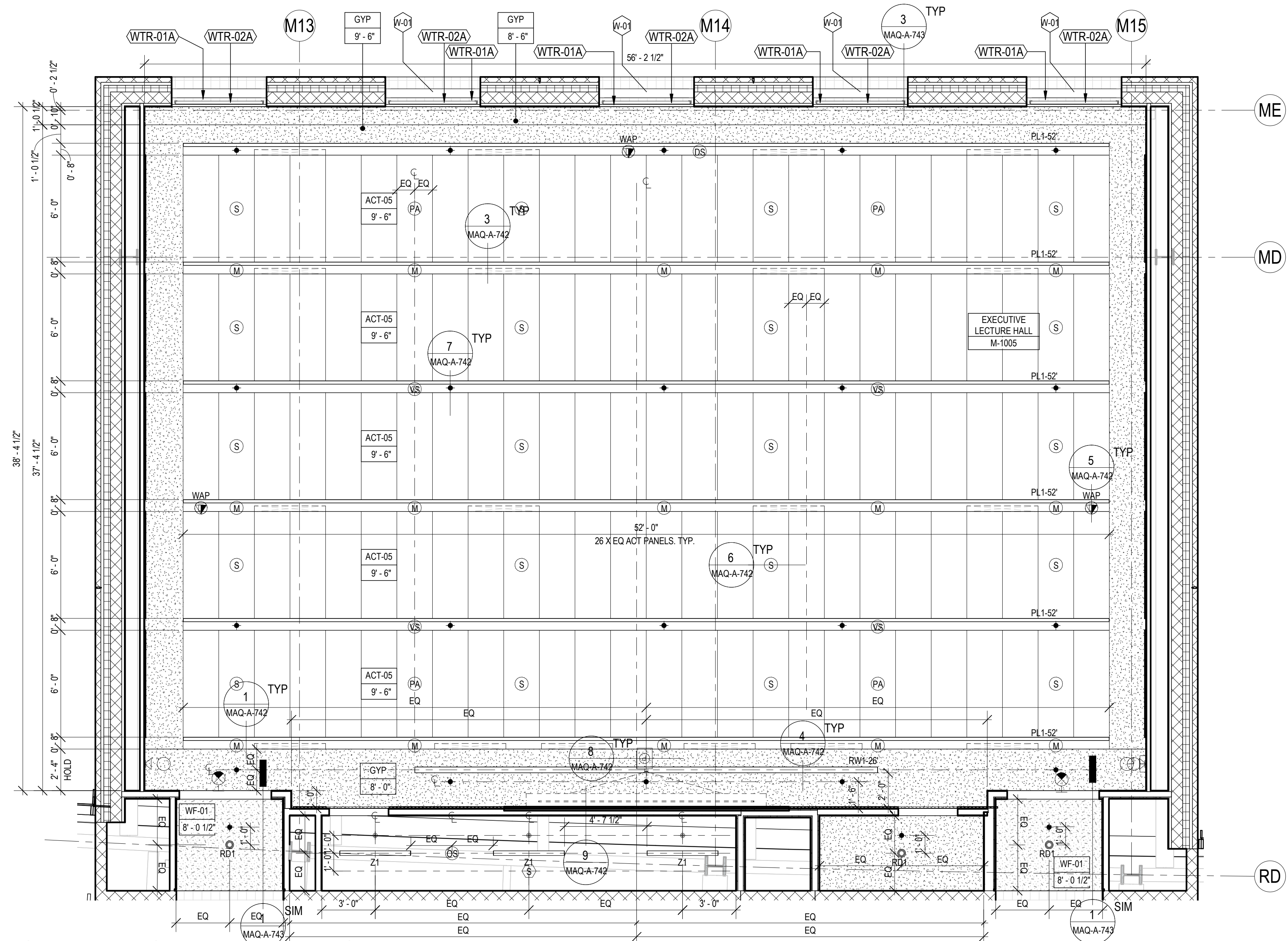
CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

SHEET No. **MAQ-A-658A**

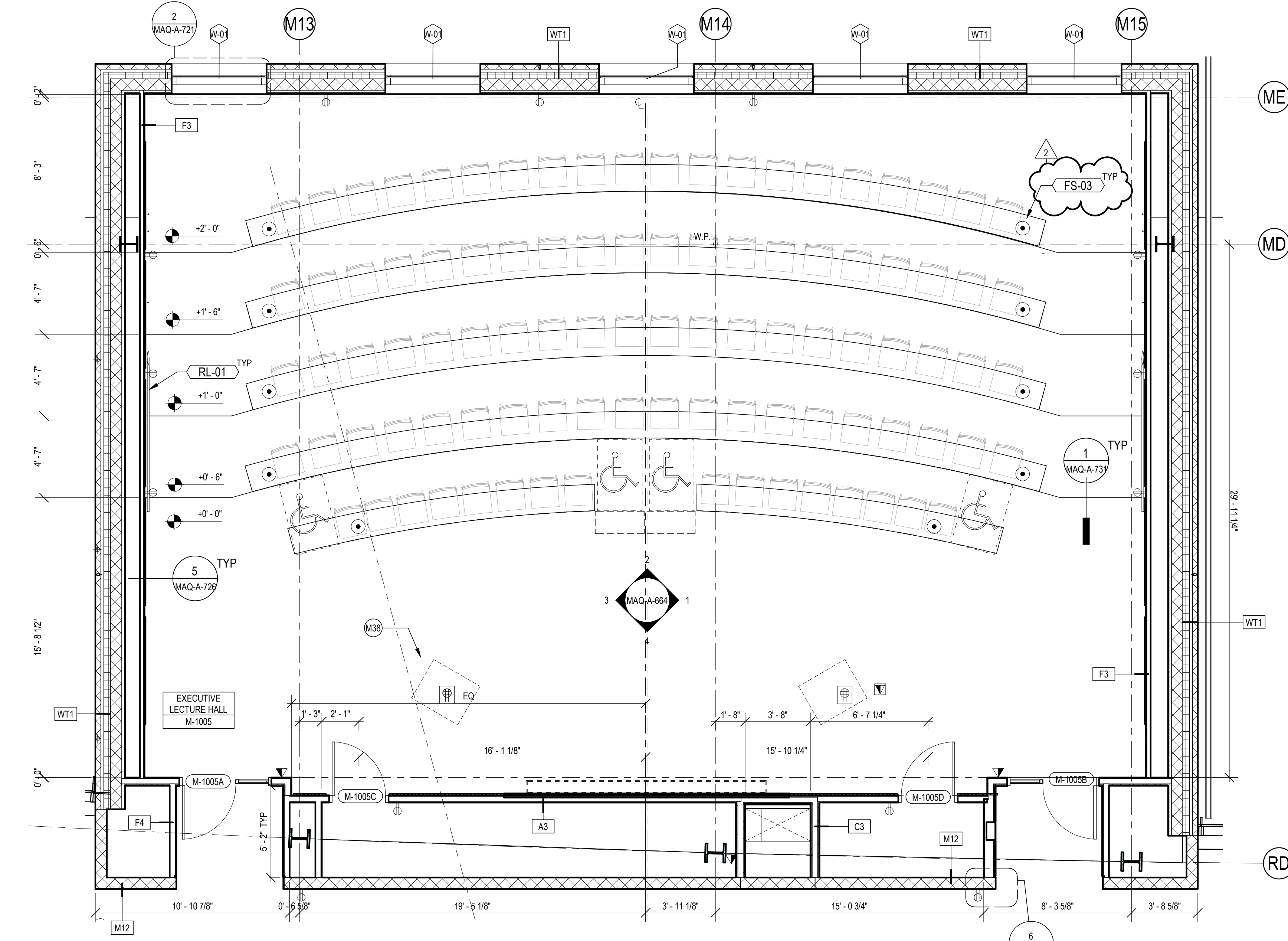
DRAWN BY	CHECKED BY	DATE	SCALE
KO	TNB	SEPT 2022	AS NOTED

1 PLAN - AUDITORIUM
SCALE: 1/4" = 1'-0"





2 EXECUTIVE LECTURE HALL - RCP
SCALE: 1/4" = 1'-0"



1 EXECUTIVE LECTURE HALL - PLAN
SCALE: 1/4" = 1'-0"

KEYNOTES	LEGEND	TACTICAL TRAINING DESIGN																		
FS-03 120100 EXECUTIVE LECTURE HALL FIXED TABLES RL-01 067000 BAR METAL HANDRAIL - BRONZE WTR-01A 122100 MECHANICAL WINDOW SHADE, LIGHT GRAY WTR-02A 122100 MECHANICAL BLACKOUT SHADE	FIRE RATINGS --- 1/2 HOUR FIRE RATING - - - 1 HOUR FIRE RATING - - - 2 HOUR FIRE RATING - - - 3 HOUR FIRE RATING --- DRAINAGE NOTE	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																		
	12 SWITCH SINGLE 1A, DOUBLE 1B, QUAD 1C, CONTROL PANEL 1D 2 ELECTRICAL OUTLET SINGLE 2A, DUPLEX 2B, QUAD 2C 3 DATA OUTLET 3 PORT 3A, 6 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 BOTTON 10 11 FLOOR BOX 11A, 11B, 11C, 11D 12 WAP 12																			
	RCP LEGEND + CONCEAL PENDANT SPRINKLER + PENDANT SPRINKLER + UPRIGHT SPRINKLER + SIDE WALL SPRINKLER --- LINEAR DIFFUSER --- DIFFUSER --- EXHAUST --- ACCESS PANEL --- XX1 LIGHT FIXTURE --- XX1 LIGHT FIXTURE --- PROJECTOR --- PROJECTOR SCREEN --- EXIT SIGN --- SPEAKER --- PAGING SPEAKER --- MICROPHONE --- SMOKE DETECTOR --- FIRE ALARM SPEAKER/STROBE --- FIRE ALARM STROBE --- OCCUPANCY SENSOR --- VACANCY --- DAYLIGHT SENSOR --- SECURITY CAMERA --- WAP ABOVE CEILING --- WAP BELOW CEILING --- WOOD BAFFLE --- WALL CLOCK																			
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	DRAWING NOTES M08 TEACHING PODIUM LOCATION	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																		
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