

EMERGENCY MANAGEMENT AND 911 COMMUNICATIONS DISPATCH CENTER

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DOCUMENT 000115 – LIST OF DRAWING SHEET

1.1 LIST OF DRAWINGS

- A. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

01 GENERAL

- G100 TITLE SHEET
- G101 ABBREVIATIONS, LEGEND, & CONDOC
- G102 ADA DETAILS

02 LIFE SAFETY

- LS101 FIRST FLOOR LIFE SAFETY PLAN

03 CIVIL

- C000 COVER & INDEX SHEET
- C100 EXISTING CONDITIONS & DEMOLITION PLAN
- C200 SITE PLAN
- C201 SITE DETAILS
- C202 SITE DETAILS
- C300 GRADING & DRAINAGE PLAN
- C301 STORMWATER DETENTION POND DETAILS
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- C400 WATER & SANITARY SEWER PLAN
- C401 WATER & SANITARY SEWER DETAILS
- C501 SWPPP PHASE 1 – INITIAL PHASE
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- C503 SWPPP PHASE 3 – STABILIZATION PHASE
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04 LANDSCAPE

- L100 LANDSCAPE SHEET KEY
- L101 LANDSCAPE PLAN
- L102 LANDSCAPE PLAN
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- L105 NOTES, DETAILS, & MASTER SCHEDULE

05 ARCHITECTURAL

- A100 EDGE OF SLAB PLAN
- A101 FIRST FLOOR PLAN
- A102 FIRST FLOOR DIMENSION PLAN
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A603	HEAD, JAMB, & SILL DETAILS
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A700	FIRST FLOOR FINISH PLAN
A701	FINISH SCHEDULES
A901	RENDERING
A902	RENDERING
A903	RENDERING
A904	RENDERING

06 STRUCTURAL

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S101	FOUNDATION / SLAB PLAN
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S202	HIGH ROOF FRAMING PLAN
S301	SECTIONS AND DETAILS
S302	SECTIONS AND DETAILS
S401	SECTIONS AND DETAILS
S402	SECTIONS AND DETAILS
S501	MASONRY DETAILS
S601	BRACING ELEVATIONS
S602	BRACING DETAILS
S603	SECTIONS AND DETAILS

07 MECHANICAL

M001	HVAC SCHEDULES
M002	HVAC SCHEDULES
M100	FIRST FLOOR PLAN – HVAC

LIST OF DRAWING SHEETS

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M110 ROOF PLAN – HVAC
M400 DETAILS – HVAC
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08 PLUMBING

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P002 PLUMBING SCHEDULES & DETAILS
P101 FLOOR PLAN – PLUMBING – SUPPLY
P102 FLOOR PLAN – PLUMBING – WASTE / VENT
P110 ROOF PLAN – PLUMBING
P200 PLUMBING – WASTER / VENT RISER

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E003 ONE-LINE DIAGRAM – UPS SERVICE
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E005 PANELBOARD SCHEDULES
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E100 LIGHTING DETAILS
E101 FIRST FLOOR PLAN
E200 ELECTRICAL DETAILS
E201 FIRST FLOOR PLAN – ELECTRICAL
E202 MECH. PLATFORM – ELECTRICAL
E210 ENLARGED FLOOR PLANS – ELECTRICAL
E211 CALL CENTER POWER SYSTEMS ANNUNCIATION
E250 OVERALL ROOF PLAN – LIGHTNING PROTECTION SYSTEM
E300 FIRE ALARM DETAILS
E301 FIRST FLOOR PLAN – FIRE ALARM
E401 FIRST FLOOR PLAN – EMERGENY RESPONDER RADIO COVERAGE (ERRC)

10 FIRE PROTECTION

F001 LEGENDS, NOTES, & SCHEDULES – FIRE PROTECTION
F100 FIRST FLOOR PLAN – FIRE PROTECTION
F500 DETAILS – FIRE PROTECTION
F501 ENLARGED PLANS & SCHEMATICS – FIRE PROTECTION

11 TECHNOLOGY

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T002 RESPONSIBILITY MATRIX
T101 VOICE / DATA FLOOR PLAN
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T302 TECHNOLOGY RISER DIAGRAMS
T401 TECHNOLOGY DETAILS
T402 TECHNOLOGY DETAILS
T501 DEVICE SCHEDULES

LIST OF DRAWING SHEETS

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END OF DOCUMENT

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SECTION 282000 CLOSED CIRCUIT TELEVISION/VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The scope of work shall include furnishing all labor, all security video cameras, pan/tilt/zoom (PTZ) cameras, mounts, housings, power supply systems, connectors, monitors and consoles, workstations, network storage managers, video encoders, video decoders, video console displays and keyboards, all other hardware and software and documentation required to provide a completely operational and working Closed Circuit Television (CCTV) System.
- B. All materials for the structured cabling system (4-pair UTP cables, fiber optic cables and 24-AWG multi-pair (25 pairs or higher)) components required for the video surveillance system shall be in compliance with specification Section 271000.
- C. The following parts of the system are not part of this contract:
 - 1. All networking equipment (switches, routers, etc) for the operation of the system
 - 2. Software licenses for the video surveillance system beyond the 12 months included in this contract.

1.2 RELATED DOCUMENTS

- A. General Terms and Conditions of the Contract Documents
 - 1. Division 16 – Electrical
- B. Supplemental: Refer to the specification sections identified below for additional requirements, which are supplemented by this section.
 - 1. 270010 Technology General Provisions
 - 2. 270528 Raceways for Technology
 - 3. 271000 Structured Cabling System
 - 4. 270526 Ground and Bonding for Communications Systems
 - 5. 281000 Electronic Security System

1.3 CCTV INSTALLER QUALIFICATIONS

- A. The Video Surveillance or CCTV installer (CI) selected for this project must be a direct representative of the products they intent to provide. All technicians assigned to install and configure this system shall be factory trained. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years under the current company name.
- B. Other required CI qualifications are:

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1. The CI shall agree, in writing, as part of their proposal, to provide both warranty and non-warranty service within 4 hours of notification of a problem. The CI shall be able to perform any and all repairs to the system within 24 hours.
2. The CI, as a minimum, must carry a current state issued limited energy license.
3. The CI shall have staff trained in programming the CCTV system as described in this specification. The CI shall submit as part of the qualifications required, the resume of the programmers for the CCTV system as well as the training certificates for this staff from the manufacturer of the system.

1.4 MATERIALS ALTERNATES AND SUBSTITUTION

- A. General: See details for alternates and substitution in specification section 270010
- B. Cameras can be substituted as long as they have the same performance specification as the cameras used as basis of design and as long as they are supported by the DVMS. It is the responsibility of the CI to verify and assure the cameras proposed as substitution are supported by the DVMS. Any cost associated with certifying a proposed camera to the DVMS to be used in this project shall be covered by the CI.

1.5 SHOP DRAWINGS AND SUBMITTALS

- A. The CI shall follow all requirements for shop drawings indicated in specification section 270010
- B. The submittal process for this scope of work will be a two stage process. The first stage is the product/installer approval. Within 60 business days of receiving contract approval and notice to proceed, the following items shall be submitted to the Architect and Engineer (A&E) of the project for review, as part of the product/installer approval process.
 1. Proof of Installer qualifications, addressing all requirements of paragraph 1.3 of this specification.
 2. Product numbers, specifications, and data sheets for all equipment.
 3. Data sheets and samples of all labeling materials and equipment to be used in the project.
 4. A complete explanation of the identification method to be used for all equipment and cabling part of the CCTV system.
 5. Data sheets of all termination blocks and mounting accessories to be used in the project. A paragraph shall be added before each data sheet indicating the intended use of each type of termination block.
 6. Detailed drawings of all custom products to be used in the project.
 7. Data sheets for all wire and cable to be used as part of this system. A paragraph shall be added before each data sheet indicating the intended use (to connect what type of devices) of each cable.
- C. The second stage of the submittal process is the shop drawing process. Shop drawings shall only be submitted after all portions of the product/installer approval have been accepted by the A&E. The following information is required as part of the shop drawings:

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1. Floor plans indication all devices to be provided and all cable runs to all devices or junction boxes. All cameras shall indicate the camera number in the system and the type of camera and mounting.
2. Point to point wiring diagrams indicating all termination points for each conductor and for each device, cable types and color coding of each termination. These diagrams shall be submitted for each camera type.
3. Storage calculation. The CI shall provide a spreadsheet with all the cameras in the project and the proposed recording frame rates, resolutions, activity percentages and times of recording with the total number of storage bytes per camera and a total for the system. The total storage capacity shall be indicated in Terabytes.
4. Bandwidth calculation. If the CI is not responsible for the networking equipment, the CI shall provide a bandwidth calculation. This calculation shall be presented in the form of a spreadsheet using MBPS as the units listing all cameras in the project. The spreadsheet shall have subtotals per network region associated with a storage area.
5. Completely fill out network configuration template provided by TLC Engineering upon request, to explain all network devices to be used in a project and to get IP addresses from the network administrator.
6. Video recording server assignment. A list of all the video servers to be provided in the project with a list of all cameras assigned to each server. Each server shall have a total bit rate estimated for all the cameras recorded showing that the capacity requirements of the server comply with the requirements in this specification.
7. Panel schedules in a table format, indicating all ports being used and what device is connected to each port. Panel schedules shall be submitted for all camera power supply, multiport encoder/decoders, computer monitor outputs, fiber optics distribution frames, Ethernet switches, patch panels, termination blocks, etc.
8. Overall system diagrams indicating all head end components, their room location, and all configuration characteristics like IP addresses, serial ports used, etc.
9. A field of view study. This field of view is a collection of still pictures with the precise field of view for each camera to be installed in the project. The field of view shall be the same coverage as the camera specified and will be used to verify installation of the cameras and during acceptance test.
10. Outline of the testing process.

1.6 ABBREVIATIONS

- A. The following abbreviations are used in this document:
1. API - Application Programming Interface
 2. ASCII - American Standard Code for Information Interchange
 3. BPS - Bits Per Second
 4. CIF - Common Intermediate Format (352 X 240)
 5. 2CIF - Common Intermediate Format (704 X 240)
 6. 4CIF - Common Intermediate Format (704 X 480)
 7. DVI - Digital Visual Interface
 8. FCC - Federal Communications Commission
 9. GUI - Graphical User Interface

10. HDMI - High Definition Multimedia Interface
11. ID - Identification
12. I/O - Input /Output
13. IPS - Images Per Second
14. MBPS - Mega Bits per Second
15. NTP - Network Time Protocol
16. NTSC - National Television Standard Committee
17. ODBC - Open Database Connectivity
18. ONVIF - Open Network Video Interface Forum
19. O&M - Operations and Maintenance
20. PAL - Phase Alternating Line
21. PIN - Personal Identification Number
22. PTZ - Pan/Tilt/Zoom
23. RAID - Redundant Array of Independent Disks
24. RoHS - Restriction of Hazardous Substances Directive
25. SDRAM - Synchronized Dynamic Random Access Memory
26. STP - Shielded Twisted Pair
27. TCP/IP - Transmission Control Protocol/Internet Protocol
28. UL - Underwriters Laboratories, Inc.
29. UPS - Uninterrupted Power Supply
30. USB - Universal Serial Bus
31. UTP - Unshielded Twisted Pair
32. VOC - Volatile Organic Compounds

1.7 SYSTEM DESCRIPTION

- A. The CCTV system shall be a TCP/IP network-based, fully distributed digital video system. The CCTV system will utilize local area networks (LAN) as a transmission medium for video, configuration, as well as storage of all data. The CCTV system shall provide full video control at the management point indicated in the design drawings, with additional full selection capability at any point within the network from a workstation or a video console display. The CCTV system shall provide unlimited expansion capability for the addition or modification of any video device or computer workstation.
- B. The CCTV system shall permit normal and event monitoring of all secured areas on digital monitors as required or shown in the specifications and drawings. In all cases, the equipment shall be state of the art, standardized commercial off-the-shelf, and modular. In all cases, the method of communication from remote locations within the network to the central components shall be transparent to the user. Equipment shall be selected and installed so repairs may be accomplished on site by module replacement, utilizing spare components whenever possible.
- C. The intent of this specification is to provide the owner with a distributed networked digital security system. Supplied by the CI, the CCTV system shall be complete and operational per the performance requirements and objectives of these specifications. The CI shall be responsible for the coordination of related work with other trades affecting his/her work or the work of others.

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- D. The CCTV System shall be fully integrated with other security components such as access control, alarm monitoring and intercom communications. The system shall be fully integrated with the access control application to allow events to be directly linked to the CCTV surveillance recording system. See specification section 281000 for details of the integration scope of work and the performance required.
- E. All cameras shall be connected and controlled through a CCTV workstation utilizing a standard mouse and keyboard.

PART 2 - PRODUCTS

2.1 DIGITAL VIDEO MANAGEMENT SYSTEM

- A. The digital video management system shall be composed of off the shelf management servers, storage system and the DVMS Software. The recording system shall be based on a unified NVR composed of a complete server, storage array, storage drives and expansion modules as required.
- B. The DVMS recording servers shall process all video streams for recording, live viewing, and playback for the cameras assigned to that recorder. Servers shall be provided in quantities as to not any single server being used at more than 75% of the maximum bit rate capacity of the server. Quantities of servers indicated in the drawings are preliminary and the CI shall provide calculations to the A&E of the final quantity of servers to be provided.
- C. The SAN storage arrays and storage expansion shall provide a network attached storage medium for the video servers.
- D. The contractor shall submit storage calculations and configuration as part of the shop drawing submittals for 30-day storage based on the recording parameters indicated in section 3.4 of this specification.

2.2 DIGITAL VIDEO MANAGEMENT SYSTEM SOFTWARE

- A. The CI shall provide all software required for the complete operation of the video surveillance system.
- B. The approved products for this system are:
 - 1. Avigilon Unity Video
- C. Other access control system software can be accepted prior approval of the A&E.
- D. At a minimum the video surveillance system software shall provide the following key features:
 - 1. Ability to see live video and recorded video in the same application software.
 - 2. Ability to export video to an open standard file like AVI files
 - 3. Ability to integrate with other system with features as indicated in this specification.

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4. Support browser based clients and standard client workstation.
5. Have video analytics incorporated into the DVMS.

2.3 DVMS MANAGEMENT SERVER

- A. The DVMS management server shall have the following specifications:
1. Processor: Two (2) Eight Core Processors, at 2.0GHz CPU, Energy Smart
 2. Front side bus: 1333 MHz
 3. Cache: 4 MB Level 2 / 12 MB Level 3
 4. Memory: 32 GB DDR3-1333MHz, Energy Smart
 5. Graphics card: SVGA Graphic Card (with VGA connector)
 6. Hard drive configuration: Integrated SAS/SATA Raid 6
 7. Back plane: 1X8 bay for 2.5" hard drives
 8. Hard drives: Four (4) 73GB 15,000 RPM SAS SCSI 3Gbps 2.5" HotPlug hard drives
 9. CD/DVD Drive: 24x CD-RW/DVD Rom Drive SATA, internal
 10. Network Card: Dual 10/100/1000 Base-T
 11. Power supply: Energy Smart redundant power supply with dual cords. NEMA 5-15p 15A 10 ft. cords.
 12. USB ports: Minimum six (6) USB 2.0
 13. Serial ports: Minimum one (1) RS-232 in DB-9 connector.
 14. Options: USB to PS2 adapter for KVM connectivity
 15. Mounting: Rack chassis with sliding rapid/versa rails and cable management arm.
 16. Operating system: Windows 200X Server as recommended by Nice Systems, with software licenses to connect all workstations and cameras in the project plus 2 spare licenses for workstations and 10 spare licenses for cameras.
 17. Warranty: 3 –year warranty.
 18. Design Selection: Dell or HP.

2.4 CCTV WORKSTATION

- A. The rack mounted CCTV Workstations shall be a certified industry standard computer in a rack configuration. It must meet all requirements established by the DVMS software manufacturer. As a minimum the system capacity shall be as follows:
1. Processor: Two (2) Six Core Xeon Processors at 3.46 Ghz CPU
 2. Front side bus: 1333 MHz
 3. Cache: 12MB
 4. Memory: 12GB SDRAM, 1333MHz, ECC
 5. Ports: 1 Parallel, 2 Serial (DB-9), 10 USB 2.0
 6. Graphics card: Two 4GB Graphics Cards SLI, with quad DVI outputs each
 7. Hard Drive: Three (3) in RAID 1 configuration 600GB SATA 10K RPM 3.0 Gb/s Hard Drive
 8. CD/DVD Drive: One (1) 16X DVD+/-RW SATA with DVD burning software and DVD player software.
 9. Network Card: 10/100/1000 Base-T
 10. Mounting: rack mounted
 11. Accessories: Standard USB keyboard and USB optical mouse.
 12. Operating system: Windows version as recommended by Avigilon.

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13. Other software: Anti-virus software included with one year license.
 14. Warranty: 3-years
 15. Design Selection: Dell or HP
- B. The desk mounted CCTV workstation shall be a supplier certified industry standard computer. It must meet all requirements established by the DVMS software manufacturer and shall have a recommended minimum system capacity as follows:
1. Processor: One (1) Intel i7 processor at 3.4 Ghz CPU
 2. Front side bus: 1333 MHz
 3. Cache: 8MB
 4. Memory: 8GB SDRAM, 1333 Hz
 5. Ports: 1 Serial (DB-9), 10 USB 2.0, 2-line in audio, 2 line out audio,
 6. Graphics card: 1GB Graphic Card, with dual DVI outputs with sound
 7. Speakers: Sound bar to be mounted under the flat panel display. External speakers desk mounted not acceptable.
 8. Hard Drive: 500GB SATA 6.0 Gb/s with 16MB DataBurst Cache Hard Drive
 9. CD/DVD Drive: One 8X Blu-ray Disc Burner with Blu-ray burning software and Blu-ray player software.
 10. Network Card: 10/100/1000 Base-T
 11. Power supply: 88% Efficient power supply
 12. Energy Efficiency: Energy Star 4.0 Category B, EPEAT gold
 13. Mounting: rack mounted, desk mounted, mini-tower or small form factor chassis as indicated in workstation list. For rack mounting, desk top units fitting a rack tray are acceptable. Mini-tower configurations on a shelf are not acceptable for rack mount.
 14. Accessories: Standard USB keyboard and USB optical mouse For rack mounted devices, USB to PS2 adapters are required.
 15. Operating system: Windows version as recommended by Avigilon.
 16. Other software: Anti-virus software included with one year license.
 17. Warranty: 3-years
 18. Design Selection: Dell or HP.
- C. The CCTV workstations shall include monitors, converters, and extenders as indicated on the drawings.
- D. The CCTV workstation shall include the Avigilon Unity video management software.

2.5 DVMS VIDEO SERVER

- A. The DVMS video server shall process the video streams from the IP cameras for recording on the storage array or viewing at workstation and decoder locations. A maximum of 36 cameras shall be programmed per server.
- B. The DVMS video server shall use commercial off the shelf server equipment with dual redundant hot swap power supplies. The server shall have a minimum of 12 GB RAM.
- C. The DVMS video server shall have Two 1 GbE ports for connection to the security network and Two 1 GbE iSCSI ports for connection to the iSCSI network switch.

2.6 DVMS STORAGE ARRAY

- A. The DVMS storage array shall store all recorded video for the required amount of time. The storage array shall also provide the interface with up to three storage expansion units connected via JBOD cable.
- B. Total capacity of the storage shall be submitted as part of the shop drawing submittal process based on final camera selections submitted for approval by Architect and Engineer.
- C. Each storage array shall have two 1GbE iSCSI ports for connection to the iSCSI network switch.

2.7 SURGE PROTECTION

- A. All CCTV components mounted outside the building shall be provided with surge and lightning protection. Provide UL listed multi-stage protection on all low voltage and signal transmission lines. All 120 VAC surge suppression devices shall be EDCO HSP121BT-1RU or an approved equal. For low voltage connections provide FAS-1 surge suppressors manufactured by EDCO or an approved equal. For coax connections provide CX-06-BNCY line protectors manufactured by EDCO or an approved equal.
- B. For exposed Ethernet connections with PoE, use EDCO CAT6-E PoE or approved equal.

2.8 WIRE & CABLE

- A. All UTP Category horizontal cables and fiber optic cables for the CCTV system shall be in compliance of all requirements in specification section 271000 and shall be under the same warranty as all UTP category cables and fiber optic cables described in specification section 271000. Color jacket for wiring for the CCTV system shall be yellow.
- B. Cable gauge: All cable gauges shall be estimated as to allow a maximum of 5% voltage drop from the source to the load. Sizes given previously are only minimum gauges accepted. The Installer shall always estimate proper values.
- C. Cable jackets: All cable jackets shall be suitable for the environment on which the cables will be installed. Use plenum rated cables when cables are installed in plenum spaces. Use riser rated cables when cables are installed through floor sleeves. Use cable jackets with water-blocking material when installed in underground conduits.
- D. Cable jackets for this project: Except when cables are run continuously in conduit all cable or patch cord cables; jackets for CCTV cables shall be plenum rated.
- E. All cables shall be RoHS compliant and free of VOC. The SSI shall provide proof of compliance for all cables during the submittal process.

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- F. Acceptable manufacturers: Belden, Alpha Wire Company, General Cable and West Penn Wire.

2.9 IDENTIFICATION AND LABELING TAGS

- A. The CI shall follow labeling materials indicated in specification section 270010.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

- A. General: The CI shall follow all installation practices indicated in specification section 270010
- B. For all building exterior applications, CCTV imagers shall be day/night type of cameras.

3.2 WIRING METHODS

- A. All proposed wire and cable shall meet or exceed the recommendations established by the equipment manufacturers, and shall comply with all state and local codes.
- B. Visually inspect all wire and cable for faulty insulation prior to installation. Protect cable ends at all times with acceptable end caps.
- C. Provide grommets and strain relief materials where necessary to avoid abrasion and excess tension on wire and cable.
- D. All penetrations through fire rated barriers shall be provided, by the CI, with appropriate fire stopping materials in accordance with NFPA requirements and local fire authority having jurisdiction.
- E. All cable runs shall be continuous from the device to the equipment. Cable splices shall not be allowed inside conduits, or cable trays.
- F. All cameras shall have a camera interface box with disconnect means to horizontal cabling for testing purposes and service. Camera interface boxes shall be located in accessible ceiling spaces as close as possible to the camera. Disconnect means shall be provided for UTP cables in the form of an 8-pin modular plug and receptacle. Disconnect means shall be provide for low voltage camera power cables in the form of insulated spade connectors (female connectors in load side, male connectors in camera side).
- G. All video cable connectors and terminations shall be 3-way crimp-on type and shall including connector cables for 24 VAC input and video/data coax output. Twist on style connectors will not be acceptable for any terminations on this project.
- H. Cables of similar signal level shall be bundled together and kept physically separate from power cords, plug strips or other circuits with different potential. Exposed wire

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bundles or individual cables shall be neatly secured with self-clinching nylon "TY Raps" (Thomas & Betts or equal). Lacing of cables shall not be permitted.

- I. All cables run part of the CCTV system in areas where ceiling is not accessible or in building exterior shall be in conduit at all times
- J. All termination of UTP Category type multi pair cables shall be done in Insulation Displacement Connectors (IDC), modular plugs or connectors. The use of wire nuts or manually twisting cables and protecting them with electrical tape are not acceptable means of termination.
- K. Components of the distribution system shall be installed in a neat, workmanlike manner consistent with all best practices.
- L. Wiring color codes shall be strictly observed and terminations shall be uniform throughout the building.

3.3 IDENTIFICATION AND TAGGING

- A. All cables, wires, wiring forms, terminal blocks, and terminals shall be clearly identified by pre-printed labels or tags. The permanent markings shall clearly indicate the function, source, and destination of all cabling, wire, and terminals. All cables shall be labeled at both ends of the cable with the same and unique identifier label.
- B. Cable and equipment identifiers shall follow a standard labeling system like TIA/EIA-606. The identification system chosen by the CI shall be submitted for approval to the A&E.
- C. All camera power supplies, patch panels shall include a work sheet attached to the interior of the equipment cabinet in plastic envelopes. This work sheet shall include the location, type of device and part number of all devices connected to the boards inside those equipments. All names used to identify devices in these worksheets shall match all names and identifiers used in the software or the user interface of the system. A second copy of this worksheet shall be delivered to as part of the as-built information.

3.4 CCTV SYSTEM PROGRAMMING

- A. The CI shall program the CCTV system and the integration to the Security System as indicated in specification section 281000.
- B. IP Video Management System (IPVMS) programming: The CI is responsible for all programming and installation labor associated with the IPVMS and the CCTV workstations, as well as all components to make the system operational. The CI shall program the IPVMS system as to create the minimum amount of traffic in the network, and still comply with all resolutions and frame rates as indicated in this specification.
- C. IP video frame rate setting: The CI shall program all settings for the IPVMS following these criteria:

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1. The system shall be programmed for 2 different modes of operation: high activity mode and low activity mode. The CI Installer shall work with the owner to establish in a regular week for each area of the building what hours in each day are considered high activity and what hours of each day are considered low activity.
2. All cameras in low traffic interior non-public hallways or rooms shall be recorded normally at 2fps @ highest resolution during high activity mode. During high activity mode frame rate shall be increased to 15 fps upon motion detection or alarm from access control system in the field of view for at least 5 minutes after motion ceased or alarm cleared. During low activity mode these cameras shall be recorded at 1 fps @ 4CIF. Upon motion detection in the field of view of those cameras, the frame rate shall be increased to 15 fps @ highest resolution for at least 5 minutes after motion ceased.
3. All cameras in public areas inside the building shall be recorded at least at 15 fps @ highest resolution during high activity mode. During low activity mode cameras in these areas shall be recorded at 4 fps @ 4CIF. Upon motion detection in the field of view of those cameras, the frame rate shall be increased to 15 fps @ highest resolution for at least 5 minutes after the motion ceased.
4. All site and exterior cameras shall be recorded at 15 fps @ highest resolution at all times.

3.5 ADDITIONAL INSTALLER RESPONSIBILITIES

- A. Upon project commencement, the CI shall provide qualified technical personnel on-site. Personnel shall be present on each consecutive working day until the system is fully functional and ready to begin the testing phase of this project.
- B. During the installation process the CI shall maintain an up-to-date set of as-built shop drawings, which shall always be available for review by the client and/or consulting engineers. This set of documents should be clearly annotated with as-built data as the work is performed. These documents will be reviewed as part of the approval process when evaluating payment request applications. At a minimum, the drawings should contain the following information:
 1. Quantity and location of all equipment installed.
 2. Cable and wire runs along with the designations tags assigned to each.
 3. Wiring diagrams that indicate terminal strip layout, identification, and terminations.
- C. The CI Project Manager shall maintain continuous coordination with the consulting engineers. The engineers shall be kept informed of the progress and all conflicts that arise during the course of this project. Prior to the start of construction the CI shall submit a complete plan and schedule for proposed operations. This schedule should include information relevant to number of employees assigned to the project, work hours, etc.

3.6 REQUEST OF IP ADDRESSES

- A. The CI shall comply with all requirements indicated in specification section 270010 for requesting IP address for the security system.

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3.7 SYSTEM WARRANTY AND SERVICE

- A. General: The CI shall follow all warranty and service requirements indicated in specification section 270010.

3.8 ENGINEER'S FINAL ACCEPTANCE TEST

- A. General: The SSI shall follow all test requirements indicated in specification section 270010.
- B. Additional requirements for the system acceptance test:
 - 1. The day of the final acceptance test the CI shall have at least two (2) 2-way radios to communicate between the testing groups. Cell phones are not acceptable for communication since it takes too long to establish communication, and will delay the test substantially. Radios shall be fully charged, and spare batteries shall be available for 8 hours of use.
 - 2. The final acceptance test will be done with two groups of people. Each group will have at least one member of each stakeholder of the project (A&E, Owner, SSI, General Installer/ Construction Manager). One group will be station in the monitoring room the other group will be going to all locations in the project where security equipment is installed.
 - 3. During the final acceptance test every single camera will be tested in the system. When possible, CCTV equipment will be tested for operation during main power failure. All features requested in this specification will be tested
- C. Testing of all structured cabling system part of the Video Surveillance system shall be done in accordance of specification section 271000

3.9 SPARE PARTS

- A. As part of this project the SSI shall provide the following spare parts:
 - 1. One (1) camera of each type in the project. Electronics only, no enclosures
 - 2. One (1) additional surge suppression of each type used in the project.
- B. A list of delivered spare parts shall be included with the close out information. This list shall indicate all components delivered and shall be signed received by the Owner. The name of person receiving the equipment shall be clearly written in the list and the date it was received.

3.10 TRAINING AND INSTRUCTION

- A. General: The CI shall follow all training requirements indicated in specification section 270010.
- B. The CI shall provide two (2) levels of training for this project as explained in this section.
- C. OPERATOR/ADMINISTRATION TRAINING.

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1. Operator/Administration training shall be provided for security and IT personnel interacting with the CCTV system in all security monitoring rooms. The purpose of this training is to explain clearly how the complete system operates and what the different status indicators mean.
2. This training shall cover at least the following topics:
 - a. Operation of the CCTV system software (all aspects).
 - b. Operation of all devices inside the security monitoring room.
 - c. Alarm response and alarm reset in the security monitoring room
 - d. Data backup/restore and achieving.
 - e. File import/export.
 - f. Creating reports and print outs.
 - g. Basic system troubleshooting.
 - h. Creating users and password reset.
3. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system.
4. One session of this type of training shall be provided. This session shall last no less than 24 hours, broken down into day sessions no longer than 6 hours each.
5. Each session could have up to 20 trainees.
6. The approved O&M manuals shall be available at the time of the training.

D. MAINTENANCE TRAINING.

1. Maintenance training shall be provided for maintenance and IT personnel. The purpose of this training is to explain how to troubleshoot and replace all field devices and hardware.
2. This training shall cover at least the following topics:
 - a. Trouble shooting and replacement of all field devices.
 - b. Installation of all cameras and their settings (jumpers, dip switches, etc).
 - c. Wire labeling system.
 - d. Software system installation and recover from system crashes.
 - e. Detail explanation on all physical keys used in CCTV devices.
 - f. Routine preventive maintenance procedures recommended by equipment manufacturers for all components of the system.
 - g. Detail explanation of source code programming for all devices that have software code specifically compiled for this project (i.e. the control system for the video wall).
3. This training shall be provided by personnel working directly for the CI or a direct employee of the manufacturer of the system.
4. One session of this type of training shall be provided and recorded. This session shall last no less than 18 hours, broken down into day sessions no longer than 6 hours each.
5. Each session could have up to 5 trainees.
6. The approved O&M manuals shall be available at the time of the training.

3.11 AS-BUILT DOCUMENTS AND CLOSE OUT INFORMATION

- A. General: The CI shall follow all as built and close out information requirements indicated in specification section 270010
- B. Additional requirements for as-built documentation shall include:

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1. Approved as-built drawings shall be a complete set of floor plans drawings, riser diagrams, and wiring details indicating the layout and interconnection of the system. All cable routings and elevation of each outlet, tie, and riser cable terminations shall be required.
 2. The content of the as-built information shall be no less than the content provided during the shop drawings, and shall be modified as per changes done during construction.
- C. Close out information shall also include:
1. Two (2) digital backups of all configuration files and databases part of the CCTV system not earlier than the day after the final acceptance test is approved. These backups shall include a list of all the file names used and a complete description of the system that each file name belong to. The media for these backups shall be a compatible media that can be read by the computer system running the specific software program.
 2. Testing reports for structured cabling system used for the CCTV system.

END OF SECTION 282000

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SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.

1.3 DEFINITIONS

- A. Allowance is a quantity of work or dollar amount established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

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1.6 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Lump-Sum Allowance: Include the sum of \$150,000.00 for the purchase and installation of FFE (Furniture, fixtures, and equipment) being coordinated by the Owner, Architect, and supplier. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
 - 1. This allowance includes material cost, receiving, handling, and installation. Contractor overhead and profit shall be included in Contract amount.
- B. Allowance No. 2: Lump-Sum Allowance: Include the sum of \$10,000 for the purchase and installation of a bronze dedication plaque & interior room identification signage as shown on sheet A604 and per the room signage schedule at the end of specification section 1014223 – ROOM IDENTIFICATION PANEL SIGNAGE. Contractor overhead and profit shall be included in Contract Amount.
- C. Allowance No. 3: Quantity Allowance: Include 1000 cu. yd. of unsatisfactory soil remediation, as specified in Section 312000 "Earth Moving." See Unit Prices Specification.

END OF SECTION 012100

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Toilet accessories.
2. Shower accessories.
3. Soap dispensers.
4. Custodial accessories.

1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Samples: For each exposed product and for each finish specified, full size.
 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 1. Identify locations using room designations indicated.
 2. Identify accessories using designations indicated.

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D. Delegated Design Submittals: For grab bars and shower seats.

1. Include structural design calculations indicating compliance with specified structural-performance requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Contractor-Installed (OFCI) Materials: See Products in this Section and Drawings.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 360 lbf concentrated load applied in any direction and at any point.

2.3 TOILET ACCESSORIES

A. Source Limitations: Obtain each type of toilet accessory from single source from single manufacturer.

B. Soap Dispensers: OFCI

C. Hand Sanitizers: OFCI

D. Paper Towel (Folded) Dispensers: OFCI

E. Toilet Tissue (Roll) Dispensers: OFCI

F. Trash Receptacles: OFCI

G. Grab Bars:

1. Basis-of-Design Product: Subject to compliance with requirements, provide

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Bradley Corporation (www.bradleycorp.com, 800-272-3539); Grab Bar Series, Model 812, or comparable product, approved by the Architect, by one of the following:

- a. ASI-American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
2. Mounting: Flanges with concealed fasteners.
 3. Material: Stainless steel, 18-gage thick.
 - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 4. Outside Diameter: 1-1/2 inches.

2.4 SHOWER ACCESSORIES

- A. Source Limitations: Obtain each type of public-use shower room accessory from single source from single manufacturer.
- B. Shower Curtain Rod:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bradley Corporation (www.bradleycorp.com); Shower Curtain Rod, Model 953, or comparable product, approved by the Architect, by one of the following:
 - a. ASI-American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 2. Description: 1-inch- outside diameter, straight rod.
 3. Configuration: As indicated on Drawings.
 4. Mounting Flanges: Exposed Concealed fasteners; in material and finish matching rod.
 5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- C. Shower Curtain:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bradley Corporation (www.bradleycorp.com); Vinyl Shower Curtain, Model 9537, or comparable product, approved by the Architect, by one of the following:
 - a. ASI-American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
 2. Size: Minimum 12 inches wider than opening by 72 inches high.
 3. Material: Vinyl, minimum 0.014-inch thick, opaque, matte.
 4. Color: White.
 5. Grommets: Corrosion resistant at minimum 6 inches on center through top hem.
 6. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
- D. Folding Shower Seat:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Bradley Corporation (www.bradleycorp.com, 800-272-3539); Reversible Phenolic Shower Seat, Model 9569, or comparable product, approved by the Architect, by

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one of the following:

- a. ASI-American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
2. Configuration: L-shaped seat, designed for wheelchair access.
 3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
 4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 5. Dimensions (Inches):
 - a. Width: 34-1/2
 - b. Depth: 37-3/8 maximum; 30-3/8 minimum.

E. Robe Hook:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Bradley Corporation (www.bradleycorp.com, 800-272-3539); Double Robe Hook, Model 9124-US, or comparable product, approved by the Architect, by one of the following:
 - a. ASI-American Specialties, Inc.
 - b. Bobrick Washroom Equipment, Inc.
2. Description: Double -prong unit.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.5 CHILDCARE ACCESSORIES

- A. Source Limitations: Obtain each type of childcare accessory from single source from single manufacturer.
- B. Diaper-Changing Station:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Koala Kare Products; Bobrick Washroom Equipment, Inc.; KB300-01SS, or comparable product, approved by the Architect, by one of the following:
 - a. ASI-American Specialties, Inc.
 - b. Bradley Corporation.
 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support minimum of 200 lb static load when opened.
 3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
 4. Operation: By pneumatic shock-absorbing mechanism.
 5. Material & Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners Stainless steel, ASTM A480/A480M No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color
 6. Liner Dispenser: Provide built-in dispenser for disposable sanitary liners.

2.6 CUSTODIAL ACCESSORIES

- A. Mop/Broom Holder with Utility Shelf: OFCI

2.7 MATERIALS

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- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

2.8 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

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END OF SECTION 102800

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under Owner's separate contracts.
4. Owner's product purchase contracts.
5. Owner Furnished/Contractor Installed (OFCI) products.
6. Contractor's use of site and premises.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and Drawing conventions.
10. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.2 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.3 PROJECT INFORMATION

- A. Project Identification: ITB 2024-006 Emergency Management and 911 Communications Dispatch Center.

1. Project Location: 1091 Capital Way, Manning, SC 29102.

- B. Owner: Clarendon County.

1. Owner's Representative: Hunter Denny, Engineering Coordinator, phone 803.433.3254.

- C. Architect: Caplea Coe Architects, 1643 Means St, Charleston, SC 29412.

1. Architect's Representative: Nate Boykin, AIA, phone 843.577.6073.

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- D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 - 1. Structural Engineer: MMSA, Inc.
 - a. Representative: Markus Ganahl, 864.331.1201.
 - 2. Civil Engineer: Hussey Gay Bell
 - a. Representative: Travis Basnett, PE, 803.799.0444 .
 - 3. MEP Engineer: Buford Goff & Associates, Inc.
 - a. Representative: Mark Watts, PE, 803.254.6302.
 - 4. Technology Consultant: Wired Engineering
 - a. Representative: Marwan Rashid, CTS, 407-716-9711.
 - 5. Commissioning Agent. MBP, Inc.
 - a. Representative: Sean Lein, PE, 704-763-4823.
 - 6. SWPPP Inspector: Dennis, a BOWMAN Company
 - a. Representative: Ricky Craps, (803)227-8602 .
- E. Contractor: TBD has been engaged as Contractor for this Project.
 - 1. Contractor Representative: TBD
- F. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 013100 "Project Management and Coordination" for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. Construction of a 10,112 GSF Type II-B Emergency Operations and 911 Communications building, primarily fabricated with concrete masonry & structural steel, clad in brick veneer & aluminum metal panels, with standing seam metal panels and modified bitumen roofing systems. The occupancy classifications of the interior spaces are B - Business, A-3 - Assembly, & R-3 - Residential. The project includes all necessary sitework, utilities, and other Work indicated in the Contract Documents.
- B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.
- B. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
 1. 911 Consoles: To Watson Consoles for fabrication, delivery, and installation of 911 consoles. The Contractor will be responsible for the power, data/communications cable, and all grounding requirements to the consoles indicated in the construction drawings. The Contractor will be required to route power to the consoles and provide receptacles as required by the construction documents. The Contractor will be required to route all data cabling indicated, terminate within the consoles as indicated, and provide certifications for all communications cabling. The Contractor shall provide grounding at the consoles at a local ground bar connected to the facility grounding system. Grounding/bonding of console mounted equipment and furniture system shall be provided by furniture and communications vendors. The Contractor shall coordinate with Watson Consoles for required access points in the raised access flooring.

1.6 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:
 1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
 2. Provide for delivery of Owner-furnished products to Project site.
 3. Upon delivery, inspect, with Contractor present, delivered items.
 - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
 4. Obtain manufacturer's inspections, service, and warranties.
 5. Inform Contractor of earliest available delivery date for Owner-furnished products.
- B. Contractor's Responsibilities: The Work includes the following, as applicable:
 1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
 2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting

discrepancies and other issues in providing for Owner-furnished products in the Work.

3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Soap Dispensers
2. Hand Sanitizers
3. Paper Towel Dispensers
4. Toilet Tissue Dispensers
5. Trash Receptacles
6. Mop/Broom Holder with shelf (in Janitor Closet)

1.7 OWNER FURNISHED / OWNER INSTALLED (OFOI) PRODUCTS

A. Markerboards & Tackboards.

1. Contractor shall be responsible for providing necessary blocking in the walls & coordinating locations with the Owner prior to installation of sheetrock.

1.8 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction operations to area identified on Civil Drawings.
2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.9 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy Project site and existing adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.10 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Weekend Hours: As directed by Owner with prior approval.
 - 2. Early Morning Hours: As directed by Owner with prior approval.
 - 3. Work in Existing Building (if required): As directed by Owner with prior approval.
 - 4. Hours for Utility Shutdowns: To be coordinated with the Owner in advance of any required shut-down.
 - 5. Hours for noisy activity. As directed by Owner with prior approval.

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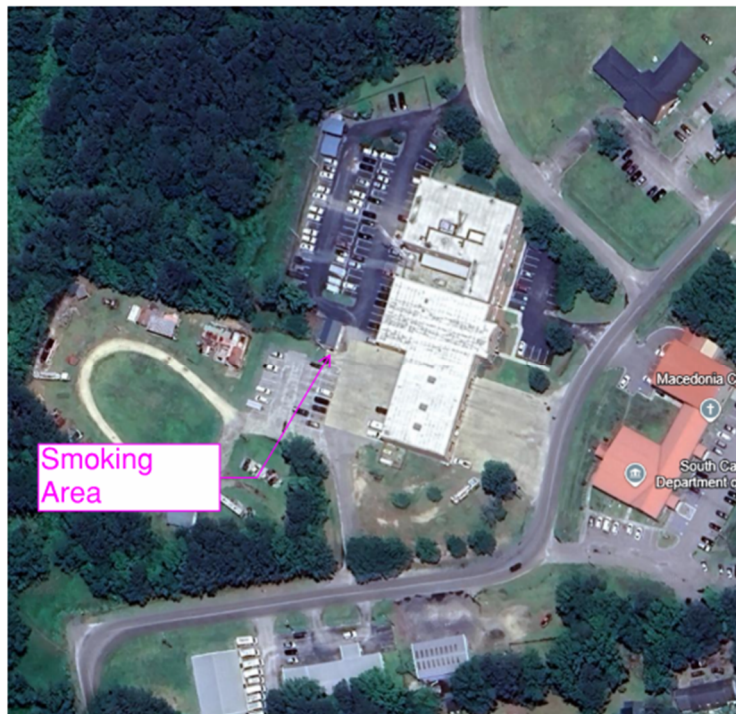
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than five days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than five days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products and other controlled substances within the new building is not permitted.
 - 1. Smoking is allowed in the smoking area behind the fire station. See map attached at the end of this section.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1.11 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to

the Work of all Sections in the Specifications.

- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.



PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Miscellaneous materials.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.2 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each product.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

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C. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
2. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches, for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For each type of product.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Manufacturer of products.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

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1.8 FIELD CONDITIONS

- A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
- B. Architectural Woodwork Standards Grade:
 - 1. Aesthetics: Custom.
 - 2. Performance: Level 4.
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: ISO 4586-3, grades as indicated or if not indicated, as required by quality standard.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Wilsonart LLC (www.wilsonart.com); include manufacturer's full range of Woodgrains and patterned finishes, or comparable products, approved by the Architect, by one of the following:
 - a. ABET Inc.
 - b. Formica Corporation.
 - c. Laminart LLC.
 - d. Pionite; a Panolam Industries International, Inc. brand.

F. Exposed Surfaces:

1. Plastic-Laminate Grade: HGS.
2. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
3. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermally fused laminate panels.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
 - b. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
 - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, ISO 4586-3, grade to match exposed surface.
2. Drawer Sides and Backs: Thermally fused laminate panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermally fused laminate panels.

H. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, ISO 4583-3, grade to match exposed surface.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints to meet performance requirements.

K. Colors, Patterns, and Finishes:

1. As selected by Architect from manufacturer's full range including metallics and specialty finishes.
2. For bidding purposes see "Interior Material Schedule" on Sheet A701.

2.2 WOOD MATERIALS

A. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.

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2.3 CABINET HARDWARE AND ACCESSORIES

- A. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening , self-closing.
- C. Finger Pulls: Berenson Bravo 3" Wide Finger Tab Cabinet Lip Pull / Drawer Lip Pull
 - 1. Color: Satin Black
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- G. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.
 - a. Type: Full extension.
 - b. Material: Galvanized steel ball bearing slides.
 - c. Motion Feature: Push to open and soft close dampener.
 - 2. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
 - 3. For drawers more than 6 inches high or more than 24 inches wide, provide 100 lb load capacity.
- H. Door Locks: ANSI/BHMA A156.11, E07121.
- I. Drawer Locks: ANSI/BHMA A156.11, E07041.
- J. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- K. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Color: Black.
- L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
 - 1. Satin Stainless Steel: ANSI/BHMA 630.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

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- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Type II water-resistant type as selected by fabricator to comply with requirements.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

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- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches on center with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips and No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish toggle bolts through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

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SECTION 113013 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Appliances specified in this Section shall be Owner Furnished / Contractor Installed (OFCI):
 - 1. Cooking appliances.
 - 2. Refrigeration appliances.
 - 3. Cleaning appliances.

1.2 ACTION SUBMITTALS

- A. Product Data: For each product.
 - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.
- C. Product Schedule: For appliances. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of appliance.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturers' special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

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1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintains, within 10 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Gas-Fueled Appliances: Certified by a qualified testing agency for each type of gas-fueled appliance according to ANSI Z21 Series standards.
- C. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in ICC A117.1.

2.2 COOKING APPLIANCES

- A. Electric Range: Slide-in range with one oven.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide KitchenAid (www.kitchenaid.com, 800-422-1230); product or comparable product, approved by the Architect.
 - 2. Product: 30-inch 5-Element Electric Slide-In Convection Range, Model KSEG700ESS.
 - 3. Width: 30 inches.
 - 4. Burners: Five.
 - 5. Oven Features:
 - a. Capacity: 6.4 cu. ft.
 - b. Operation: Baking convection.
 - 6. Electric Power Supply: As indicated on Drawings.
 - 7. Material/Finish: Stainless steel.
 - 8. Warranty: One year parts and labor.
- B. Hood: See Mechanical Drawings & Specifications for Residential Suppression Hood
- C. Microwave Oven:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide KitchenAid (www.kitchenaid.com, 800-422-1230); product or comparable product, approved by the Architect.
 - 2. Product: 24" Countertop Microwave, Model KMCS324RPS.
 - 3. Mounting: Countertop.
 - 4. Type: Convection.

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5. Dimensions:
 - a. Width: 24-3/4 inches.
 - b. Depth: 18-5/16 inches.
 - c. Height: 14-3/16 inches.
6. Capacity: 2.2 cu. ft.
7. Material/Finish: Stainless steel.
8. Warranty: One year parts and labor.

2.3 REFRIGERATION APPLIANCES

A. Refrigerator: Single door refrigerator complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Frigidaire Professional (www.frigidaire.com, 800-374-4432); product or comparable product, approved by the Architect.
2. Product: Single Door Refrigerator, Model FPRU19F8WF.
3. Type: Freestanding.
4. Dimensions:
 - a. Width: 32-7/8 inches.
 - b. Depth: 27 inches.
 - c. Height: 72-1/2 inches.
5. Storage Capacity:
 - a. 19 cu. ft.
6. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.
7. Material/Finish: Stainless steel.
8. Installation: Install in tandem with freezer & 79" Louvered trim kit, Model TRMKTEZ2LV79

B. Freezer: Single door freezer complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Frigidaire Professional (www.frigidaire.com, 800-374-4432); product or comparable product, approved by the Architect.
2. Product: Single Door Freezer, Model FPFU19F8WF.
3. Type: Freestanding.
4. Dimensions:
 - a. Width: 32-7/8 inches.
 - b. Depth: 27 inches.
 - c. Height: 72-1/2 inches.
5. Storage Capacity:
 - a. 18.9 cu. ft.
6. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.
7. Material/Finish: Stainless steel.
8. Installation: Install in tandem with refrigerator & 79" Louvered trim kit, Model TRMKTEZ2LV79

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C. Undercounter Refrigerator: Single door refrigerator complying with AHAM HRF-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Summit (www.summitappliance.com, 718-893-3900); product or comparable product, approved by the Architect.
2. Product: 24" Wide Built-In All-Refrigerator, Model ASDAS2413.
3. Type: Built-In.
4. Dimensions:
 - a. Width: 23.38 inches.
 - b. Depth: 17.75 inches.
 - c. Height: 32 inches.
5. Storage Capacity:
 - a. 3.1 cu. ft.
6. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.
7. Material/Finish: Stainless steel.

D. Undercounter Ice maker:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Whirlpool (www.whirlpool.com, 800-422-1230); products or comparable products, approved by the Architect.
2. Ice maker:
 - a. Product: 24" Under Counter Refrigerator, Model WUR35X24HZ
 - b. Type: Free-standing.
 - c. Dimensions:
 - 1) Width: 22-3/4 inches.
 - 2) Depth: 25-5/8 inches
 - 3) Height: 35.
 - d. Ice Capacity:
 - 1) Storage: 25 lbs.
 - e. Material/Finish: Stainless steel.

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f. Warranty:

- 1) Three Years: Parts and labor warranty on entire machine.
- 2) Five Years: Parts and labor warranty on evaporator

2.4 CLEANING APPLIANCES

A. Clothes Washer: Complying with AHAM HLW-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Maytag Appliances (www.maytag.com, 800-344-1274); product or comparable product, approved by the Architect.
2. Product: Front Load Washer with Extra Power & 16-Hr Fresh Hold, Model MHW6630HC
3. Type: Freestanding, front-loading unit.
4. Dimensions:
 - a. Width: 27 inches.
 - b. Depth: 32-15/16 inches.
 - c. Height: 38-5/8 inches.
5. Drum: Perforated stainless steel.
 - a. Capacity: 4.8 cu. ft.
6. Electrical Power: 120 V, 60 Hz, 1 phase, 15 A.
7. Motor: Manufacturer's standard with built-in overload protector.
8. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.
9. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
10. Color: Metallic Slate.
11. Warranty: One year parts and labor.

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B. Clothes Dryer: Complying with AHAM HLD-1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Electrolux Major Appliances, NA (www.electrolux.com, 877-435-3287); product or comparable product, approved by the Architect.
2. Product: Front Load Electric Dryer, Model MED6630H
3. Type: Freestanding, frontloading, electric unit.
4. Dimensions:
 - a. Width: 27 inches.
 - b. Depth: 30-11/16 inches.
 - c. Height: 38-1/8 inches.
5. Drum: Perforated stainless steel.
 - a. Capacity: 7.3 cu. ft.
6. Color: Titanium.
7. Warranty: One year parts and labor.

C. Dishwasher: Complying with AHAM DW-1

1. Basis-of-Design Product: Subject to compliance with requirements, provide KitchenAid Appliances (www.kitchenaid.com, 800-422-1230); product or comparable product, approved by the Architect.
2. Product: 360 Max Jets Third Rack Dishwasher, Model KDTM804LPS
3. Type: Built-In undercounter
4. Dimensions:
 - a. Width: 23-7/8 inches.
 - b. Depth: 26-3/4 inches.
 - c. Height: 33-5/8 inches.
5. Capacity: 7.25 cu. Ft.
6. Color: Stainless Steel
7. Sound Level: 44dBA
8. Tub & Door Liner: Stainless steel with sealed detergent & automatic rinsing aid dispensers
9. Rack System: Stainless steel Third rack, w/ third rack jets
10. Controls: Top mounted touch controls w/ 5 wash cycles & heated fan dry
11. Features:
 - a. Self-cleaning food-filter system
 - b. Hot-water booster heater
 - c. Lock-out feature
 - d. Full-load option
 - e. Delay-wash option
 - f. Digital display panel
 - g. Soil-sensing water use control system
12. Finish: Stainless Steel

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2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install appliances according to manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify

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- compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. pPrepare test and inspection reports.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 113013

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SECTION 220813 - COMMISSIONING OF PLUMBING SYSTEMS

GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The purpose of this section is to specify the Division 22 contractor responsibilities in the commissioning (Cx) process.
- B. Commissioning requires the participation of the Division 22 contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in Section 019113, General Commissioning Requirements. The Division 22 contractor shall be familiar with all parts of Section 019113 and the Cx Plan issued by the Commissioning Authority (CxA) and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
- C. Section includes Cx process requirements for the following plumbing systems, assemblies, and equipment:
 - 1. Centralized domestic hot water systems (100% sample of 1 system)
 - a. Water heaters (Sample 2 of 2)
 - b. Circulating pumps (Sample 2 of 2)
 - c. Thermostatic mixing valves (Sample 2 of 2)

1.3 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process, as specifically related to the plumbing systems, are provided in this section.
- B. Refer to Section 019113 and the Cx Plan for all typical commissioning process requirements for each team member.
- C. Each Contractor and subcontractor shall review this Section and shall include in their bids cost for carrying out the work described, as it applies to each Division and Section of these specifications, individually and collectively.
- D. The commissioning responsibilities applicable to the contractors of Division 22 are as follows (all references apply to commissioned equipment only):

Construction and Acceptance Phases

- 1. Include the cost of commissioning work in the contract price.
- 2. Attend a commissioning kick-off meeting and other necessary meetings scheduled by the CxA to facilitate the Cx process, as indicated in specification section 019113.
- 3. Contractors shall provide the CxA with cut sheets and shop drawing submittals of commissioned equipment to the CxA.
- 4. Provide additional requested documentation, prior to normal O&M manual submittals, to the CxA for development of Functional Performance Testing (FPT) procedures.
 - a. Typically, this will include detailed manufacturer installation and startup, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information,

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including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.

- b. The CxA may request further documentation necessary for the commissioning process.
5. Provide a copy of the equipment submittals of commissioned equipment, through normal channels, to the CxA for review and comment.
6. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
7. Provide assistance to the CxA in preparation of the specific FPT procedures listed in the Cx Plan (prepared by the CxA), Section 019113 and this section. Contractor shall review test procedures to ensure feasibility, safety and equipment protection.
8. Develop a full startup and initial checkout plan using manufacturer's startup procedures from the CxA. Submit manufacturer's detailed startup procedures and the full startup plan and procedures and other requested equipment documentation to CxA for review and comment.
9. During the startup and initial checkout process, execute and document the plumbing-related portions provided by the CxA in the online commissioning portal, CxAlloy, for all commissioned equipment.
10. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CxA.
11. Address current A/E punch list items before functional testing.
12. Provide skilled technicians to execute starting of equipment and to execute the FPTs. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
13. Perform FPT under the direction of the CxA for specified equipment in the Cx Plan, this Section and Section 019113. Assist the CxA in interpreting the monitoring data, as necessary.
14. Correct deficiencies (differences between specified and observed performance) as interpreted by the CxA, OR and A/E and retest the equipment.
15. During construction, maintain hard copy and CAD as-built red-line drawings for all drawings and provide final record drawings for all owner and contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).

1.4 RELATED WORK

- A. Refer to Section 019113 for a listing of all sections where commissioning requirements are found.
- B. Refer to Section 019113 for all systems to be commissioned.

1.5 SUBMITTALS

- A. Division 22 shall provide submittal documentation relative to commissioning to the CxA as requested by the CxA. Refer to Section 019113 for additional Division 22 requirements.

1.6 WEB-BASED COMMISSIONING PORTAL

- A. All general and major contractors participating in the Cx process shall use the web-based Cx Portal, CxAlloy ("Portal" or "CxAlloy") to document the Cx procedures. The Portal is a Web-based Internet hub used to electronically collaborate and coordinate activities and deliverables throughout the Cx process. The Portal is hosted by the CxA and shall be accessible to all Parties participating in the Cx program. The Portal provides a common location to store Startup Documentation, FPTs and results, Issues Log tracking, project documents and deliverables. It also serves as a collaborative e-mail hub to facilitate, automate, and track communications between Parties relating to the Cx process.

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PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The Division 22 contractor shall provide all test equipment necessary to fulfill the testing requirements of this Division.
- B. Refer to Section 019113 for additional Division 22 test equipment requirements.
- C. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment through the contractor. The manufacturer shall provide the test equipment, demonstrate its use and assist the CxA in the Cx process.

2.2 INCIDENTAL EQUIPMENT

- A. The Division 22 contractor shall provide all scaffolds, staging, ladders and accessories required to allow testing agencies, consultants and Owner's staff safe access to equipment, valves and other devices located above floor level.

PART 3 - EXECUTION

3.1 MEETINGS

- A. Refer to Section 019113 for additional meeting requirements.
- B. Participation at various commissioning meetings shall depend on the purpose of the meeting and may consist of, but not be limited to, the following members of the project commissioning team: the Owner's representative (i.e. project manager and/or facility staff), the CxA, the Construction Manager (CM) or General Contractor (GC), subcontractors and/or manufacturer's technical representative as required, the architect/engineer (A/E), and any specialists deemed appropriate by the Cx team.
- C. All the listed Cx team members shall participate in the Cx kick-off meeting.
- D. Participate, as applicable, in Cx coordination meetings in accordance with related Section 019113.
- E. Participate, as needed, in deficiency resolution meetings.

3.2 STARTUP

- A. The plumbing contractor shall follow the startup and initial checkout procedures for the equipment and systems listed in the Summary in this section and Section 019113. The Division 22 contractor has startup responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility to the CxA or Owner.
- B. FPT is intended to begin upon completion of a system. FPT will not proceed prior to the completion of systems, or sub-systems, which includes completion and approval of any necessary testing, adjusting and balancing (TAB) requirements.

3.3 CALIBRATION

- A. Sensor and actuator calibration and calibration methods are covered in Section 019113 and other

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Division 22 Sections and are the responsibility of the Division 22 contractor.

3.4 TESTING PREPARATION

- A. Inspect and verify the position of each device and interlock identified on checklists.
- B. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, started, quality control tested and code tested (as applicable) and are operating according to the Contract Documents.
- C. Certify that plumbing instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest setpoints have been recorded.
- D. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved by the Engineer of Record.
- E. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 FUNCTIONAL PERFORMANCE TESTS

- A. FPT is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CxA and Owner. Beginning system testing before full completion does not relieve the Contractor from fully completing the system as soon as possible.
- B. Refer to Section 019113 for a complete list of systems to be commissioned and a description of the process.
- C. Sampling Strategy:
 - 1. Centralized domestic hot water systems (100% sample of 1 system)
 - a. Water heaters (Sample 2 of 2)
 - b. Circulating pumps (Sample 2 of 2)
 - c. Thermostatic mixing valves (Sample 2 of 2)
- B. Refer to Section 019113, Sampling for the Sampling/Failure Rule.
- C. Typical aspects of plumbing FPTs verify that systems, subsystems and equipment function interactively and throughout the full range of operating conditions (e.g. low load, design load, component failures, alarm conditions, safety interlocks including with life safety systems, etc.) and modes (e.g. normal shutdown, normal auto position, normal manual position, power failure including control power, emergency power, unoccupied, fire alarm, etc.). The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Positive confirmation of state/status shall be shown both locally and via the BAS, as specified in the Contract Documents.
- D. Development of Test Procedures: Before test procedures are written, the CxA shall obtain project contract documentation and a current list of change orders and RFI's affecting equipment or systems, including an updated points list, program code, control sequences and parameters and electrical coordination study. The CxA shall develop specific test procedures and forms for evaluating performance of all integral components and their functioning as a complete unit within design requirements and manufacturer's published data. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractors who shall review the tests for feasibility, safety, equipment and warranty protection.

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3.6 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

- A. Refer to Section 019113 for specific details on non-conformance issues relating to tests.
- B. Refer to Section 019113 for issues relating to functional performance tests.

3.7 DEFERRED TESTING

- A. Refer to Section 019113 for requirements of deferred testing.

3.8 WRITTEN WORK PRODUCTS

- A. Written work products of Contractors will consist of the startup and initial checkout plan described in Section 019113 and the completed startup and initial checkout.

END OF SECTION 220813

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SECTION 230813 - COMMISSIONING OF MECHANICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The purpose of this section is to specify the Division 23 contractor responsibilities in the commissioning (Cx) process.
- B. Commissioning requires the participation of the Division 23 contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in Section 019113, General Commissioning Requirements. The Division 23 contractor shall be familiar with all parts of Section 019113 and the Cx Plan issued by the Commissioning Authority (CxA) and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
- C. Section includes Cx process requirements for the following HVAC systems, assemblies, and equipment:
 - 1. Mechanical systems (HVAC)
 - a. Single Packaged Heat Pumps (Sample 4 of 4)
 - b. Computer Room Air Conditioners (CRAC) (Sample 2 of 2)
 - c. Exhaust Fans (Sample 3 of 10)
 - d. Variable Refrigerant Flow Split Systems (Sample 5 of 18)
 - e. Split System Outside Air Units (DOAS) (Sample 2 of 2)
 - f. Direct Digital Control (DDC) System – HVAC controls (limited to sampling rates listed above)

1.3 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process, as specifically related to the mechanical systems, are provided in this section.
- B. Refer to Section 019113 and the Cx Plan for all typical commissioning process requirements for each team member.
- C. Each Contractor and subcontractor shall review this Section and shall include in their bids cost for carrying out the work described, as it applies to each Division and Section of these specifications, individually and collectively.
- D. The commissioning responsibilities applicable to each of the mechanical, controls and TAB contractors of Division 23 are as follows (all references apply to commissioned equipment only):

Construction and Acceptance Phases

- 1. Include the cost of commissioning work in the contract price.
- 2. Attend a commissioning kick-off meeting and other necessary meetings scheduled by the CxA to facilitate the Cx process, as indicated in specification section 019113.

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3. Contractors shall provide the CxA with cut sheets and shop drawing submittals of commissioned equipment to the CxA.
4. Provide additional requested documentation, prior to normal O&M manual submittals, to the CxA for development of Functional Performance Testing (FPT) procedures.
 - a. Typically, this will include detailed manufacturer installation and startup, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, startup and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent.
 - b. The CxA may request further documentation necessary for the commissioning process.
5. Provide a copy of the equipment submittals of commissioned equipment, through normal channels, to the CxA for review and comment.
6. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
7. Provide assistance to the CxA in preparing the specific FPT procedures as specified in the Cx Plan (prepared by the CxA), Section 019113 and this section. Contractor(s) shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
8. Develop a full startup and initial checkout plan using manufacturer's startup procedures from the CxA for all commissioned equipment. Submit manufacturer's detailed startup procedures and the full startup plan and procedures and other requested equipment documentation to CxA for review and comment. Refer to Section 019113 for further details on startup plan preparation.
9. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CxA.
10. Address current A/E punch list items before FPT. Air and water TAB shall be completed with discrepancies and problems remedied. The TAB Report is to be reviewed and approved by the Engineer of Record prior to beginning TAB verification and FPT.
11. Provide skilled technicians to execute starting of equipment and to execute the FPTs. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
12. Perform FPTs under the direction of the CxA for specified equipment in the Cx Plan, Section 019113 and this Section. Assist the CxA in interpreting the monitoring data, as necessary.
13. Correct deficiencies (differences between specified and observed performance) as interpreted by the CxA, Construction Manager/General Contractor (CM/GC) and A/E and retest the equipment.
14. During construction, maintain as-built/record red-line drawings and CAD drawings and provide final record drawings for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).

E. Mechanical Contractor

Construction and Acceptance Phases

1. Provide startup for all HVAC equipment, except for the building automation control system.
2. Assist and cooperate with the TAB contractor and CxA by:
 - a. Putting all HVAC equipment and systems into operation and continuing the operation during each working day of TAB and commissioning, as required.
 - b. Including cost of sheaves and belts that may be required by TAB.
 - c. Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. The Division 23 contractor shall provide an approved plug.

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- d. Providing temperature and pressure taps according to the Construction Documents and at each water sensor which is an input point to the control system, for TAB and commissioning testing.
3. List and clearly identify on the as-built drawings the locations of all air-flow stations.
4. Prepare a preliminary schedule for Division 23 pipe and duct system testing, flushing and cleaning, equipment startup and TAB start and completion for use by the CxA. Update the schedule as appropriate.
5. Notify the Owner, CM/GC, or CxA depending on protocol, when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and TAB will occur. Be responsible to notify the Owner, CM/GC, or CxA, ahead of time, when commissioning activities not yet performed or not yet scheduled will delay construction. Be proactive in seeing that commissioning processes are executed and that the CxA has the scheduling information needed to efficiently execute the commissioning process.

F. Controls Contractor

Construction and Acceptance Phases

1. Sequences of Operation Submittals. The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:
 - a. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
 - b. All interactions and interlocks with other systems.
 - c. Detailed delineation of control between any packaged controls and the building automation system, listing what points the BAS monitors only and what BAS points are control points and are adjustable.
 - d. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
 - e. Startup sequences.
 - f. Warm-up mode sequences.
 - g. Normal operating mode sequences.
 - h. Unoccupied mode sequences.
 - i. Shutdown sequences.
 - j. Capacity control sequences and equipment staging.
 - k. Temperature and pressure control: setbacks, setups, resets, etc.
 - l. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 - m. Effects of power or equipment failure with all standby component functions.
 - n. Sequences for all alarms and emergency shutdowns.
 - o. Seasonal operational differences and recommendations.
 - p. Initial and recommended values for all adjustable settings, set points and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 - q. Schedules, if known.
 - r. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered.
2. Control Drawings Submittal
 - a. The control drawings shall have a key to all abbreviations.
 - b. The control drawings shall contain graphic schematic depictions of the systems and each

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- component.
 - c. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - d. Provide a full points list with at least the following included for each point:
 - 1) Controlled system
 - 2) Point abbreviation
 - 3) Point description (e.g., DB temp, airflow, relative humidity, static pressure, etc.)
 - 4) Display unit
 - 5) Control point or set point (Point that controls equipment and can have its set point changed, e.g. OAT, SAT, etc.) (Yes / No)
 - 6) Monitoring point (Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification) (Yes / No)
 - 7) Intermediate point (Point whose value is used to make a calculation which then controls equipment, e.g. space temperatures that are averaged to a virtual point to control reset) (Yes / No)
 - 8) Calculated point ("Virtual" point generated from calculations of other point values) (Yes / No)
 - 9) Control dead bands and any applicable times for feedback control loops
 - e. The Controls Contractor shall keep the CxA informed of all changes to this list during programming and setup.
3. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
4. Assist and cooperate with the TAB contractor in the following manner:
- a. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).
 - b. For a given area, have all required calibrations, startup and selected functional tests of the system completed and approved by the CxA prior to TAB.
 - c. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB or provide sufficient training for TAB to operate the system without assistance.
5. Assist and cooperate with the CxA in the following manner:
- a. Using a skilled technician who is familiar with this building, execute the FPT of the controls system as specified for the controls contractor in the Cx Plan, Section 019113 and this Section. Provide two-way radios during the testing if necessary for communications.
 - b. Execute all control system trend logs specified and as requested by the CxA.
6. The controls contractor shall prepare a written plan indicating in a step-by-step manner, the procedures that will be followed to test, checkout and adjust the control system prior to FPT, according to the process in Section 019113. At a minimum, the plan shall include for each type of equipment controlled by the automatic controls:
- a. System name.
 - b. List of devices.
 - c. Step-by-step procedures for testing each controller after installation, including:

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- 1) Process of verifying proper hardware and wiring installation.
 - 2) Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - 3) Process of performing operational checks of each controlled component.
- d. Plan and process for calibrating valve and damper actuators and all sensors.
- 1) Sensor and Actuator Calibration
 - a) All field-installed temperature and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated. Verify that all locations are appropriate and away from causes of erratic operation (i.e. unstable flow conditions, other heat sources, vibration, emf, and rf interference). Submit to the CxA through the owner the calibration methods and results. Sensors installed in a piece of equipment at the factory with a current calibration certificate provided need not be field calibrated. Provide bench testing as required at the direction of the CxA.
 - b) All procedures used shall be fully documented on suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
 - 2) Sensor Calibration Methods
 - a) All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation (i.e. unstable flow conditions, other heat sources, vibration, emf and rf interference). Verify that sensors with shielded cable are grounded only at one end (at ground shield buss or isolated ground). For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading, of each other, for pressure.
 - b) Sensors without Transmitters: Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or BAS) is within the tolerances in the table below of the instrument-measured value over the full range of expected control. If not, install offset in the BAS, calibrate or replace sensor.
 - 3) Sensors with Transmitters: Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or BAS) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.
- e. A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.

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- f. A copy of the log and field checkout sheets that will document the process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has “passed” and is operating within the contract parameters.
 - g. A description of the instrumentation required for testing.
 - h. Indication of which tests should be completed prior to TAB using the control system for TAB work. Coordinate with the CxA and TAB contractor for this determination.
7. Provide a signed and dated certification to the CxA and CM/GC upon completion of the checkout of each controlled device, equipment and system prior to FPT for each piece of equipment or system, that all system programming is complete.
8. Beyond the control points necessary to execute all documented control sequences, provide monitoring, control and virtual points as specified in Section 230923.
9. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
10. Assist the CxA with implementation and integration of the Monitoring-Based Commissioning (MBCx) hardware (agent) and software to perform MBCx services. This may require the additional points in the BAS system to be p=made discoverable and implementing BACnet communications protocol, where necessary for interfacing.

G. TAB Contractor

Construction and Acceptance Phases

1. Six weeks prior to starting TAB, submit to the CM/GC the qualifications of the site technician for the project, including the names of the contractors and facility managers of recent projects the technician has led. The Owner will approve the site technician's qualifications for this project.
2. Submit the outline of the TAB plan and approach for each system and component to the Owner, CxA, CM/GC and the controls contractor a minimum of six weeks prior to starting the TAB. This plan will be developed after the TAB has some familiarity with the control system.
3. The submitted plan will include:
 - a. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and contractors to sufficiently understand the design intent for each system.
 - b. An explanation of the intended use of the building control system. The controls contractor will comment on feasibility of the plan.
 - c. All field checkout sheets and logs to be used that list each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - d. Discussion of what notations and markings will be made on the duct and piping drawings during the TAB process. It should be noted of ANSI and ASME pressure vessel stamp requirements for all boiler system components that apply.
 - e. Final test report forms to be used.
 - f. Detailed step-by-step procedures for TAB work for each system and issue: terminal flow calibration (for each terminal type), diffuser proportioning, branch / submain proportioning, total flow calculations, rechecking, diversity issues, expected problems and solutions, etc. Criteria for using air flow straighteners or relocating flow stations and sensors will be discussed. Provide the analogous explanations for the water side.
 - g. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - h. Details of how total flow will be determined (Air: sum of terminal flows via BAS calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations. Water: hot water flow, chilled water flow, hot and

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- chilled water system parameters, domestic hot water system parameters, total domestic water parameters, pump curves, circuit setter, triple-duty valves, pressure reducing stations, flow station, ultrasonic, etc.).
- i. The identification and types of measurement instruments to be used and their most recent calibration date.
 - j. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and provide methods to verify this.
 - k. Confirmation that TAB understands the outside air ventilation criteria under all conditions.
 - l. Details of whether and how minimum outside air cfm will be verified and set, and for what level (total building, zone, etc.).
 - m. Details of how building static and exhaust fan / relief damper capacity will be checked.
 - n. Proposed selection points for sound measurements and sound measurement methods.
 - o. Details of methods for making any specified coil or other system plant capacity measurements.
 - p. Details of any TAB work to be done in phases (by floor, etc.), or of areas to be built out later.
 - q. Details regarding specified deferred or seasonal TAB work.
 - r. Details of any specified false loading of systems to complete TAB work.
 - s. Details of all exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - t. Details of any required interstitial cavity differential pressure measurements and calculations.
 - u. Plan for hand-written field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - v. Plan for formal progress reports (scope and frequency).
 - w. Plan for formal deficiency reports (scope, frequency and distribution).
- 4. A running log of events and issues shall be kept by the TAB field technicians. Submit hand-written reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests to the Owner, CxA and CM/GC at least twice a week.
 - 5. Communicate in writing to the controls contractor all set point and parameter changes made or problems and discrepancies identified during TAB which affect the control system setup and operation.
 - 6. Provide a draft TAB report within two weeks of completion. A copy will be provided to the Owner, design team and CxA. The report will contain a full explanation of the methodology, assumptions and the results in a clear format with designations of all uncommon abbreviations and column headings. The report should follow the latest and most rigorous reporting recommendations by AABC, NEBB or ASHRAE Standard 111.
 - 7. Provide the CxA with any requested data, gathered, but not shown on the draft reports.
 - 8. Provide a final TAB report for the Owner, design team and CxA with details, as in the draft. The final TAB Report shall be submitted with approval by the Engineer of Record a minimum of 10 days before beginning TAB Verification.
 - 9. Conduct FPT and checks on the original TAB as specified for TAB requirements in the Cx Plan and Section 019113.

1.4 RELATED WORK

- A. Refer to Section 019113 for a listing of all sections where commissioning requirements are found.
- B. Refer to Section 019113 for systems to be commissioned.

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1.5 SUBMITTALS

- A. Division 23 shall provide submittal documentation relative to commissioning to the CxA as requested by the CxA. Refer to Section 019113 for additional Division 23 requirements.

1.6 WEB-BASED COMMISSIONING PORTAL

- A. All general and major contractors participating in the Cx process shall use the web-based Cx Portal, CxAlloy ("Portal" or "CxAlloy") to document the Cx procedures. The Portal is a Web-based Internet hub used to electronically collaborate and coordinate activities and deliverables throughout the Cx process. The Portal is hosted by the CxA and shall be accessible to all Parties participating in the Cx program. The Portal provides a common location to store Startup Documentation, FPTs and results, Issues Log tracking, project documents and deliverables. It also serves as a collaborative e-mail hub to facilitate, automate, and track communications between Parties relating to the Cx process.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Division 23 contractor shall provide all test equipment necessary to fulfill the testing requirements of this Division.
- B. Refer to Section 019113 for additional Division 23 test equipment requirements.
- C. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment through the contractor. The manufacturer shall provide the test equipment, demonstrate its use and assist the CxA in the Cx process.

2.2 INCIDENTAL EQUIPMENT

- A. The Division 23 contractor shall provide all scaffolds, staging, ladders and accessories required to allow testing agencies, consultants and Owner's staff safe access to equipment, valves and other devices located above floor level.

PART 3 - EXECUTION

3.1 MEETINGS

- A. Refer to Section 019113 for additional meeting requirements.
- B. Participation at various commissioning meetings shall depend on the purpose of the meeting and may consist of, but not be limited to, the following members of the project commissioning team: the Owner's representative (i.e. project manager and/or facility staff), the CxA, the CM/GC, subcontractors and/or manufacturer's technical representative as required, the architect/engineer (A/E), and any specialists deemed appropriate by the Cx team.
- C. All the listed Cx team members shall participate in the Cx kick-off meeting.
- D. Participate, as applicable, in Cx coordination meetings in accordance with related Section 019113.
- E. Participate, as needed, in deficiency resolution meetings.

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3.2 STARTUP

- A. The HVAC mechanical and controls contractors shall follow the startup, initial checkout procedures, listed in the Responsibilities list in this section and Section 019113. The Division 23 contractor has startup responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility to the CxA or Owner.
- B. FPT is intended to begin upon completion of a system. FPT will not proceed prior to the completion of systems, or sub-systems, which includes completion and approval of any necessary testing, adjusting and balancing (TAB) requirements.

3.3 CALIBRATION

- A. Sensor and actuator calibration and calibration methods are covered in Section 019113 and Division 23 and are the responsibility of the Division 23 contractor.

3.4 TESTING PREPARATION

- A. Inspect and verify the position of each device and interlock identified on checklists.
- B. Certify that Mechanical systems, subsystems, and equipment have been installed, calibrated, started, quality control tested and code tested (as applicable) and are operating according to the Contract Documents.
- C. Certify that mechanical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest setpoints have been recorded.
- D. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved by the Engineer of Record.
- E. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.5 FUNCTIONAL PERFORMANCE TESTS

- A. FPT is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CxA and Owner. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, as soon as possible
- B. Refer to Section 019113 for a list of systems to be commissioned and a description of the process.
- C. Sampling Strategy:
 - 1. Mechanical systems (HVAC)
 - a. Single Packaged Heat Pumps (Sample 4 of 4)
 - b. Computer Room Air Conditioners (CRAC) (Sample 2 of 2)
 - c. Exhaust Fans (Sample 3 of 10)
 - d. Variable Refrigerant Flow Split Systems (Sample 5 of 18)
 - e. Split System Outside Air Units (DOAS) (Sample 2 of 2)
 - f. Direct Digital Control (DDC) System – HVAC controls (limited to sampling rates listed above)

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- D. Refer to Section 019113, Sampling for the Sampling/Failure Rule.
- E. Typical aspects of mechanical FPTs verify that systems, subsystems and equipment function interactively and throughout the full range of operating conditions (e.g. low load, design load, component failures, alarm conditions, safety interlocks including with life safety systems, etc.) and modes (e.g. normal shutdown, normal auto position, normal manual position, power failure including control power, emergency power, unoccupied, fire alarm, etc.). The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Positive confirmation of state/status shall be shown both locally and via the BAS, as specified in the Contract Documents.
- F. Development of Test Procedures: Before test procedures are written, the CxA shall obtain project contract documentation and a current list of change orders and RFI's affecting equipment or systems, including an updated points list, program code, control sequences and parameters and electrical coordination study. The CxA shall develop specific test procedures and forms for evaluating performance of all integral components and their functioning as a complete unit within design requirements and manufacturer's published data. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractors who shall review the tests for feasibility, safety, equipment and warranty protection.

3.6 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

- A. Refer to Section 019113 for specific details on non-conformance issues relating to tests.
- B. Refer to Section 019113 for issues relating to functional performance tests.

3.7 DEFERRED TESTING

- A. Refer to Section 019113 for requirements of deferred testing.

3.8 WRITTEN WORK PRODUCTS

- A. Written work products of the Division 23 contractors will consist of the startup and initial checkout plan described in Section 019113 and the completed startup and initial checkout.

END OF SECTION 230813

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SECTION 260813 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The purpose of this section is to specify Division 26 contractor responsibilities in the commissioning (Cx) process.
- B. Commissioning requires the participation of the Division 26 contractor to ensure that all systems are operating in a manner consistent with the Contract Documents. The general commissioning requirements and coordination are detailed in Section 019113, General Commissioning Requirements. The Division 26 contractor shall be familiar with all parts of Section 019113 and the Cx Plan issued by the Commissioning Authority (CxA) and shall execute all commissioning responsibilities assigned to them in the Contract Documents.
- C. Section includes Cx process requirements for the following electrical systems, assemblies, and equipment:
 - 1. Electrical system
 - a. Emergency generator (100% sample)
 - b. Automatic transfer switch (100% sample)
 - c. Uninterruptible power supply (UPS) (100% Sample)
 - d. Lighting controls: occupancy sensors and scheduled control (10% sample)
 - e. Fire alarm system limited to interface with the mechanical systems

1.3 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process, as specifically related to the electrical systems, are provided in this section.
- B. Refer to Section 019113 and the Cx Plan for all typical commissioning process requirements for each team member.
- C. Each Contractor and subcontractor shall review this Section and shall include in their bids cost for carrying out the work described, as it applies to each Division and Section of these specifications, individually and collectively.
- D. The commissioning responsibilities applicable to the contractors of Division 26 are as follows (all references apply to commissioned equipment only):

Construction and Acceptance Phases

- 1. Include the cost of commissioning work in the contract price
- 2. Attend a commissioning kick-off meeting and other meetings scheduled by the CxA as necessary to facilitate the Cx process, as indicated in specification section 019113.
- 3. Contractors shall provide the CxA with cut sheets and shop drawing submittals of commissioned equipment.
- 4. Provide additional requested documentation, prior to O&M manual submittals, to the CxA for development of Functional Performance Testing (FPT) procedures.

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- a. This will include detailed manufacturer installation and startup, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation and checkout materials that are shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CxA.
 - b. The CxA may request further documentation necessary for the commissioning process.
 - c. This data request may be made prior to normal submittals.
5. Provide a copy of the equipment submittals of commissioned equipment, through normal channels, to the CxA for review and comment.
6. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
7. Provide assistance to the CxA in preparing the specific FPT procedures specified in the Cx Plan (prepared by the CxA), Section 019113 and this section. Contractor shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
8. Develop a full startup and initial checkout plan using manufacturer's startup procedures. Submit manufacturer's detailed startup procedures and the full startup plan and procedures and other requested equipment documentation to CxA for review and comment prior to startup. Refer to Section 019113 for further details on startup plan preparation.
9. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CxA.
10. Address current A/E punch list items before functional performance testing.
11. Provide skilled technicians to execute starting of equipment and to execute the FPTs. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
12. Perform FPT under the direction of the CxA for specified equipment in the Cx Plan, Section 019113 and this Section. Assist the CxA in interpreting the monitoring data, as necessary.
13. Correct deficiencies as indicated by the CxA and directed by the OPM and/or A/E and retest the equipment.
14. During construction, maintain as-built/record red-line drawings and CAD drawings and provide final record drawings for contractor-generated coordination drawings. Update after completion of commissioning (excluding deferred testing).

1.4 RELATED WORK

- A. Refer to Section 019113 for a listing of all sections where commissioning requirements are found.
- B. Refer to Section 019113 for systems to be commissioned.

1.5 SUBMITTALS

- A. Division 26 shall provide submittal documentation relative to commissioning to the CxA as requested by the CxA. Refer to Section 019113 for additional Division 26 requirements.

1.6 WEB-BASED COMMISSIONING PORTAL

- A. All general and major contractors participating in the Cx process shall use the web-based Cx Portal, CxAlloy ("Portal" or "CxAlloy") to document the Cx procedures. The Portal is a Web-based Internet hub used to electronically collaborate and coordinate activities and deliverables throughout the Cx process. The Portal is hosted by the CxA and shall be accessible to all Parties participating in the Cx program. The Portal provides a common location to store Startup Documentation, FPTs and results, Issues Log tracking, project documents and deliverables. It also serves as a collaborative e-mail hub to facilitate, automate, and track communications between Parties relating to the Cx process.

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PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. The Division 26 contractor shall provide all test equipment necessary to fulfill the testing requirements of this Division 26 systems and equipment.
- B. Refer to Section 019113 for additional Division 26 requirements.
- C. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment through the contractor. The manufacturer shall provide the test equipment, demonstrate its use and assist the CxA in the Cx process.

2.2 INCIDENTAL EQUIPMENT

- A. The Division 26 contractor shall provide all scaffolds, staging, ladders and accessories required to allow testing agencies, consultants and Owner's staff safe access to equipment, electrical boxes and other devices located above floor level.

PART 3 - EXECUTION

3.1 MEETINGS

- A. Refer to Section 019113 for additional meeting requirements.
- B. Participation at various commissioning meetings shall depend on the purpose of the meeting and may consist of, but not be limited to, the following members of the project commissioning team: the Owner's representative (i.e. project manager and/or facility staff), the CxA, the CM/GC, subcontractors and/or manufacturer's technical representative as required, the architect/engineer (A/E), and any specialists deemed appropriate by the Cx team.
- C. All the listed Cx team members shall participate in the Cx kick-off meeting.
- D. Participate, as applicable, in Cx coordination meetings in accordance with related Section 019113.
- E. Participate, as needed, in deficiency resolution meetings.

3.2 STARTUP

- A. The electrical contractor shall follow the startup, initial checkout procedures listed in the Responsibilities list in this section and Section 019113. The Division 26 contractor has startup responsibility and is required to complete systems and sub-systems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the CxA or Owner.
- B. FPT is intended to begin upon completion of a system. FPT will not proceed prior to the completion of systems, or sub-systems, which includes completion and approval of any necessary testing requirements.

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3.3 TESTING PREPARATION

- A. Inspect and verify the position of each device and interlock identified on checklists.
- B. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, started, quality control tested and code tested (as applicable) and are operating according to the Contract Documents.
- C. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest setpoints have been recorded.

3.4 FUNCTIONAL PERFORMANCE TESTS

- A. FPT is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CxA and Owner. Beginning system testing before full completion does not relieve the Contractor from fully completing the system as soon as possible.
- B. Refer to Section 019113 for a description of the process.
- C. Sampling Strategy:
 - 1. Electrical system
 - a. Emergency generator (100% sample)
 - b. Automatic transfer switch (100% sample)
 - c. Uninterruptible power supply (UPS) (100% Sample)
 - d. Lighting controls: occupancy sensors and scheduled control (10% sample)
 - e. Fire alarm system limited to interface with the mechanical systems
- D. Refer to Section 011913, Sampling for the Sampling/Failure Rate.
- E. Typical aspects of electrical FPTs verify that systems, subsystems and equipment function interactively and throughout the full range of operating conditions (e.g. low load, design load, component failures, alarm conditions, safety interlocks including with life safety systems, etc.) and modes (e.g. normal shutdown, normal auto position, normal manual position, power failure including control power, emergency power, unoccupied, fire alarm, etc.). The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Positive confirmation of state/status shall be shown both locally and via the BAS, as specified in the Contract Documents.
- F. Development of Test Procedures: Before test procedures are written, the CxA shall obtain project contract documentation and a current list of change orders and RFI's affecting equipment or systems, including an updated points list, program code, control sequences and parameters and electrical coordination study. The CxA shall develop specific test procedures and forms for evaluating performance of all integral components and their functioning as a complete unit within design requirements and manufacturer's published data. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractors who shall review the tests for feasibility, safety, equipment and warranty protection.

3.5 TESTING DOCUMENTATION, NON-CONFORMANCE AND ACCEPTANCE

- A. Refer to Section 019113 for specific details on non-conformance issues relating to tests.

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- B. Refer to Section 019113 for issues relating to functional performance tests.

3.6 DEFERRED TESTING

- A. Refer to Section 019113 for requirements of deferred testing.

3.7 WRITTEN WORK PRODUCTS

- A. Written work products of Contractors will consist of the startup and initial checkout plan described in Section 019113 and the completed startup and initial checkout.

END OF SECTION 260813

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SECTION 239005.2 - HEAT TRANSFER (ELECTRIC COOLING, VRF SYSTEMS)

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. General:

1. Furnish all labor, materials, tools and equipment and perform all operations in connection with the installation of heat transfer equipment (VRF, variable refrigerant flow) and appurtenances where shown on the drawings and specified hereinafter.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to this section.
- B. All sections of Division 23 specifications apply to this section. In addition, refer to these specification sections:
 1. Section 23 0502 - Common HVAC Materials
 2. Section 23 9005 – Heat Transfer (Electric Cooling)

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. All work shall meet or exceed the standards and procedures of the following as referenced (latest editions):
 - a. ARI Standards 210/240, 340, and 360
 - b. ANSI UL – 1995 Heating and Cooling Equipment
 - c. Underwriter's Laboratory
 - d. NFPA 90A
 - e. AMCA 210 Test Code For Air Moving Devices
 - f. National Electrical Code
 - g. ASHRAE 15 - Safety Code for Mechanical Refrigeration
- B. All motors and equipment shall be U.L. labeled.
- C. All insulation and materials shall have a flame spread rating of less than 25 and smoke developed of less than 50.
- D. All heating and cooling equipment shall bear the ARI seal.
- E. All coils shall be ARI certified.
- F. All electric heaters shall have impedance protection per UL519.

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- G. All outdoor cabinets shall meet or exceed the 500 hour salt spray test unless more stringent tests are specified.
- H. Manufacturers:
 - 1. The following variable refrigerant flow manufacturers are acceptable:
 - a. Mitsubishi
 - b. Daikin
 - c. LG
 - 2. The following variable refrigerant flow indoor unit condensate pumps are acceptable:
 - a. Sauermann
 - b. Approved Equal
 - 3. The following variable refrigerant flow outside air processing unit manufacturers (with hot gas reheat) are acceptable:
 - a. LG
 - b. Oxygen8/Daikin
 - c. Mitsubishi/Trane

PART 2 - PRODUCTS

2.1 GENERAL

- A. Equipment shall meet or exceed the scheduled efficiencies or ASHRAE 90.1, whichever is greater.
- B. System shall be:
 - 1. Heat recovery (each unit can operate in heat pump mode, heating or cooling, as commanded).
- C. Refrigerant Circuits:
 - 1. All units shall have factory installed high pressure sensor and switch, low pressure sensor, liquid line filter dryer, liquid line sight glass, pressure tap ports, check valves, and suction and liquid service valves.
 - 2. Units shall have reversing valve, suction line accumulator, and discharge muffler.
 - 3. Where low ambient control is required, electronic head pressure control shall be provided.
 - 4. Subcooling feature.
 - 5. Refrigerant circuits shall be charged with dehydrated air prior to shipping.

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D. Safeties:

1. Units shall have a solid state defrost control. Defrost shall occur only when coil saturated suction temperature indicates freezing temperatures. Defrosting shall be limited to a maximum of 10 minutes over a 90 minute period.
2. Provide a time-guard device to prevent compressor recycling by requiring a 5-minute delay before restarting.

E. Unit shall be factory assembled and tested.

F. Standard operating range for cooling shall be 23°F to 122°F outdoor ambient except where low ambient controls are required. Heating operating range shall be to 0°F dry bulb outdoor ambient without additional low ambient controls or an auxiliary heat source.

G. Standard operating range for indoor units shall be -14 degrees F to 122 degrees F.

H. System shall continue to provide heat to the indoor units in heating operation while in the defrost mode. Reverse cycle (cooling mode) defrost during heating operation shall not be permitted due to the potential reduction in space temperature.

I. Refrigerant shall be R410A.

J. All motors shall be premium efficiency.

K. Condensate Pumps:

1. All indoor units shall be provided with condensate pumps.
2. Condensate pumps shall be by the equipment manufacturer except for fan coil units, vertical units, and wall mounted units.

2.2 CONDENSER

A. Outdoor Cabinets:

1. Unit shall be designed for outdoor installation.
2. Cabinet shall be constructed of heavy duty galvanized steel. Frame and panels shall be 18 gauge minimum. They shall be zinc coated or epoxy coated with a baked-on finish.
3. Prewired control panel.

B. Compressor:

1. The inverter scroll compressors shall be variable speed capable of changing the speed to follow the variations in total cooling and heating load as determined by the suction gas pressure measured in the condensing unit. Evaporator and condenser temperatures shall be read every 20 seconds and pressures calculated. With each reading, the compressor capacity shall be controlled to eliminate deviation from target value.
2. The inverter driven compressor in each condensing unit shall be of highly efficient, digitally commutating, hermetically sealed scroll type with a maximum speed of 7,980 rpm.
3. The capacity control range shall be as low as 4% to 100%.
4. Each non-inverter compressor shall also be of the hermetically sealed scroll type.

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5. Each compressor shall be equipped with a crankcase heater, high pressure safety switch, and internal thermal overload protector.
6. An oil separator with an intelligent oil management system shall be provided.
7. The compressor shall be spring mounted to minimize the transmission of vibration.
8. Minimum number of compressors shall be:
 - a. 6-12 ton – 2 compressors
 - b. 14 ton – 3 compressors
 - c. 16-20 ton – 4 compressors
 - d. 22-24 ton – 5 compressors
 - e. 26-28 ton – 6 compressors
9. In the event of compressor failure, the remaining compressors shall continue to operate and provide heating or cooling as required.
10. Compressors shall be started in a sequence to equalize run time of each compressor.

C. Outdoor Coil:

1. The outdoor coil shall be constructed of aluminum spine fin mechanical bonded to seamless copper tubing with all joints brazed.
2. Fins shall be covered with a permanent anti-corrosion coating.
3. Pipe plates shall be treated with powdered polyester resin for corrosion prevention.

D. Outdoor Fans:

1. Fan motors shall be permanently lubricated, weatherproof motors suitable for outdoor use.
2. Motors shall be multiple speed operation via digital commutating inverter.
3. Motor shall have built-in current and thermal overload protection.
4. Fans shall be resiliently mounted and seismically isolated.
5. Fans shall be statically and dynamically balanced.
6. Provide PVC coated fan guard.

E. Electrical (Outdoor Unit):

1. Provide control circuit fuses, crank case heater, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
2. Provide transformer for motor or heaters as required.
3. Transformers shall be factory mounted and wired.
4. Provide a start capacitor for single phase units.

2.3 INDOOR UNIT (GENERAL)

A. General:

1. The indoor unit shall be completely factory assembled and tested. Included in the unit is factory wiring, piping, electronic proportional expansion valve, control circuit board, fan motor thermal protector, flare connections, condensate drain pan, condensate drain pump, condensate safety shutoff and alarm, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.

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2. The cabinet shall be constructed with a galvanized steel casing and sound absorbing foamed polystyrene and polyethylene insulation.
3. Provide needlepoint bipolar ionization.

B. Fan:

1. The fan shall be direct-drive fan with statically and dynamically balanced impeller with high and low fan speeds available.
2. The fan motor shall be equipped with adjustable external static pressure settings.
3. The fan motor shall be thermally protected.

C. Coil:

1. The indoor coil shall be constructed of aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.
2. The coil shall be of a waffle louver fin and high heat exchange, rifled bore tube design to ensure highly efficient performance.
3. The coil shall be completely factory tested.
4. A condensate pump with a minimum 21 inch lift shall be located below the coil in ceiling mounted units in the condensate pan. The pump shall have a built-in safety alarm.
5. A thermistor will be located on the liquid and gas line.

D. Electrical:

1. A separate power supply will be required of 208/230 volts, 1 phase, 60 hertz. The acceptable voltage range shall be 187 to 253 volts.

E. Control:

1. The unit shall be equipped with a program drying mechanism that dehumidifies while limiting changes in room temperature.
2. Computerized PID control shall control superheat.
3. Thermistor mounted in the return air.
4. The unit shall be compatible with interfacing with the building automation system via LonWorks or BACnet gateways.

2.4 BRANCH SELECTOR BOX (HEAT RECOVERY SYSTEM)

A. General:

1. Selector boxes shall be factory assembled, wired, piped, and tested.
2. When the system is simultaneously heating and cooling, the units in heating mode shall energize their subcooling electronic expansion valve.

B. Unit Cabinet:

1. Units shall have a galvanized steel plate casing.
2. Each cabinet shall house the expansion valves.
3. The cabinet shall contain one subcooling heat exchanger per branch.
4. The unit shall have sound absorption thermal insulation material made of flame and heat resistant foamed polyethylene.

C. Refrigerant Valves:

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1. The unit shall be furnished with 5 electronic expansion valves per branch to control the direction of refrigerant flow. The use of solenoid valves for changeover and pressure equalization shall not be acceptable.

D. Condensate Removal:

1. The unit shall not require provisions for condensate removal.

E. Electrical:

1. The unit electrical power shall be 208/230 volts, 1 phase, 60 hertz.
2. The unit shall be capable of operation within the limits of 187 volts to 255 volts.
3. The control voltage between the indoor and condensing unit shall be 16VDC non-shielded 2 conductor cable.

2.5 4-WAY CEILING CASSETTE UNIT

A. General:

1. The 4-way supply air flow can be field modified to 3-way and 2-way airflow to accommodate various installation configurations including corner installations. The supply is distributed via motorized louvers which can be adjusted from 0 degrees (horizontal) to 90 degrees (vertical).
2. Return air shall be through the concentric panel.

B. Filter:

1. The return air shall be filtered by a washable long-life filter with mildew resistant resin.

C. Sound Levels:

1. The indoor units sound pressure shall be 33 dB(A) maximum at low speed measured at 5 feet below the unit.

D. Accessories:

1. Fresh air intake kit
2. Supply air branch duct connections
3. Hard wired wall mounted sensor
4. Mounting brackets

2.6 CONCEALED CEILING DUCTED UNIT (STANDARD MODEL)

A. General:

1. The cabinet shall have supply and return air openings.

B. Filter:

1. The return air shall be filtered by a washable long-life filter with mildew resistant resin.

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C. Sound Levels:

1. The indoor units sound pressure shall be 48 dB(A) maximum at low speed measured at 5 feet below the unit.

D. Accessories:

1. Hard wired wall mounted sensor.
2. Mounting brackets.

2.7 CONCEALED CEILING MOUNTED DUCTED UNIT (SLIM MODEL)

A. General:

1. The cabinet shall have supply and return air openings.
2. The casing shall be 8" maximum height.

B. Filter:

1. The return air shall be filtered by a washable long-life filter with mildew resistant resin.

C. Sound Levels:

1. The indoor units sound pressure shall be 32 dB(A) maximum at low speed measured at 5 feet below the unit.

D. Accessories:

1. Hard wired wall mounted sensor
2. Mounting brackets

2.8 CEILING SUSPENDED CASSETTE UNIT

A. General:

1. The unit shall have a louver that can be set to automatically and continuously change the direction of the airflow.

B. Filter:

1. The return air shall be filtered by a washable long-life filter with mildew resistant resin.

C. Sound Levels:

1. The indoor units sound pressure shall be 38 dB(A) maximum at low speed measured at 3.3 feet below the unit.

D. Control:

1. The discharge louver can be set from the room controller to five (5) different positions.

E. Accessories:

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1. Hard wired wall mounted sensor
2. Mounting brackets

2.9 WALL-MOUNTED UNITS

A. General:

1. Unit shall be a recessed wall mounted unit.
2. The unit shall have a louver that can be set to automatically and continuously change the direction of airflow.

B. Filter:

1. The return air shall be filtered by a washable long-life filter with mildew resistant resin.

C. Sound Levels:

1. The indoor sound pressure shall be 40 dB(A) maximum at low speed measured at 3.3 feet below the unit.

D. Control:

1. The discharge louver can be set from the room controller to five (5) different positions.

E. Accessories:

1. Hard wired wall mounted sensor
2. Wall mounting template

2.10 REFRIGERANT PIPING AND SPECIALTIES

- A. If the manufacturer includes in their literature the option of utilizing specialty refrigerant pipe fittings for controlling or distributing refrigerant flow, these fittings must be furnished and installed at all locations recommended by the manufacturer.

- B. All piping and fittings shall meet the requirements of the manufacturer.

2.11 SYSTEM CONTROLS

- A. The system shall be controlled by a central control panel.

- B. The panel shall control or monitor the following for each unit:

1. Cooling and heating setpoints
2. Setpoint ranges
3. Cooling and heating setback temperatures
4. Alarms
5. Fan speed
6. Filter
7. Scheduling

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- C. The system shall allow remote monitoring and control by the District's building automation system through web based software.
- D. The variable refrigerant system shall have a gateway controller that allows the variable refrigerant controls to interface with the building control system via BACnet.

2.12 CONDENSATE PUMPS (FAN COIL AND WALL MOUNTED UNITS)

A. General:

- 1. This pump shall replace any factory supplied pump.
- 2. The pump shall be powered from the indoor unit.

B. Pump:

- 1. Piston pump
- 2. Electronic water sensing
- 3. High water cutout and anti-siphon fitting
- 4. Condensate filter
- 5. 25 dB(A) @ 3.3 ft.
- 6. 120V/1ph power
- 7. 2.5 GPH @ 20 ft. lift at 0 ft. suction

C. Wall Mounted Unit:

- 1. The pump shall be designed to fit in or directly beneath the wall mounted unit.
- 2. If external to the wall mounted unit, the pump shall be in a casing similar to the wall mounted unit.

D. Accessories:

- 1. Covers for the refrigerant and drain lines. Covers shall match the unit construction.

E. The basis of design manufacturer shall be:

- 1. Sauermann Si-20

2.13 OUTSIDE AIR PROCESSING UNIT (WITH HOT GAS REHEAT):

A. General:

- 1. Unit shall be a concealed ceiling mounted unit.
- 2. The cabinet shall have supply and return air openings.
- 3. The unit shall be capable of controlling 100% outside air to a fixed discharge air temperature.
- 4. Unit shall have modulating hot gas reheat to reheat the supply air as required on the schedule.

B. Filter Rack:

1. Filter rack shall be capable of holding a 2" filter.

C. Sound Levels:

1. The indoor sound pressure shall be 47 dB(A) at low speed measured 5 feet below the unit.

D. Accessories:

1. Mounting brackets.

2. Condensate pump.

PART 3 - EXECUTION

3.1 WARRANTY

- A. Compressor shall have five (5) year parts and labor warranty.
- B. Compressor Failure:
 - 1. When a compressor fails within the warranty period, the compressor shall be replaced.
 - 2. If the system has multiple compressors on a single refrigerant circuit, and one compressor fails, all compressors shall be replaced during the warranty period.

3.2 REFRIGERANT PIPE INSTALLATION

- A. All pipe shall be installed and leak tested in strict accordance with the manufacturer's requirement using the tools, products, and procedures recommended by the manufacturer.
- B. The system shall be installed by persons who have been trained and certified by the variable refrigerant flow equipment manufacturer.

3.3 SUBMITTALS

- A. Submit with the equipment submittals the following information:
 - 1. Names and certification numbers of technicians installing the system.
 - 2. Manufacturer's detailed installation procedures.
 - 3. Manufacturer's detailed test procedures.
- B. Submittals shall include detailed piping drawings including length and size of piping and all required fittings. Drawings shall be:
 - 1. Drawn on building floor plan.
 - 2. Be based upon contractor's review of existing conditions.
 - 3. Be based upon review of all bid documents to ensure proper clearance to equipment is provided.

3.4 CONTROL PANELS

- A. Coordinate control panel locations with the Owner.

3.5 STARTUP AND COMMISSIONING:

- A. Systems shall be started up by a local manufacturer's representative.
- B. The local manufacturer's representative shall make regular site visits (minimum once a month after system installation begins) and submit reports to the contractor and engineer of any outstanding items that are noticed. The manufacturer's representative shall verify that all equipment, branch selectors, and branch fittings are installed per the manufacturer's recommended installation requirements.
- C. Before shut-off valves are opened at the outdoor units, the local manufacturer's representative shall witness piping system evacuation to below 500 microns
- D. The local manufacturer's representative shall perform a factory commissioning that verifies that each unit is properly functioning, communicating and addressed. For systems that communicate back to a system controller the communication to each indoor unit shall be verified.
- E. A startup and commissioning checklist shall be provided in the closeout documents for each system. The installing contractor shall sign off that each system is properly functioning.

END OF SECTION

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SECTION 28 31 11 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SCOPE:

- A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of a complete fire alarm system as shown on the drawings and as herein specified.
- B. All equipment, devices and wiring required to form a complete code-compliant fire alarm system and comply with the requirements of this specification shall be included.

1.2 RELATED WORK/SECTIONS:

- A. In addition to this section, the requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.
- B. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.

1.3 QUALITY ASSURANCE:

- A. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of fire alarm systems and components.
- B. The complete installation is to conform to the applicable sections of NFPA-72 (current edition), Local Code Requirements and National Electric Code with particular attention to Article 760.
- C. The entire installed system and all integrated system operations shall be within the guidelines of the International Building Code.
- D. UL Compliance and Labeling: Comply with applicable requirements of UL Standards 827, 864 and 1481 pertaining to fire alarm facilities and installation. Provide fire alarm systems and components which are UL listed and labeled.
- E. The system is not required to be U.L. certificated. However, the following items shall be included in the bid:
 - 1. System installation, checkout/testing, and system demonstration for the Owner, Engineer, and Authority Having Jurisdiction per NFPA-72 requirements and per the Construction Drawings and Specifications.
 - 2. Minimum of one year of Central Station monitoring (including cellular carrier subscription service).
 - 3. Minimum of one year of runner service.

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4. One semi-annual inspection and testing service per NFPA-72.
 5. Annual inspection and testing per NFPA-72 to occur eleven months following the issue date of the initial system acceptance.
- F. Prior to training and prior to acceptance testing, and if requested by the Owner, the Fire Alarm Fire Alarm Subcontractor shall provide options for an annual maintenance and testing services agreement for up to five (5) years.

1.4 SUBMITTALS:

- A. General: Submit each item in this Section according to the Conditions of the Contract and applicable Division 26 Specification Sections.
- B. Shop Drawings: As a minimum, the fire alarm and fire detection shop drawing submittal shall include the following:
1. Complete data sheets bearing the printed logo or trademark of the fire alarm control panel manufacturer for all equipment.
 2. Complete calculations showing the following:
 - a. Battery calculations for all system power supplies and amplifiers.
 - b. Voltage drop (audible/visual notification appliance circuits)
 3. Written certification by the contractor that no battery, power supply or circuit on the system has an electrical load greater than 80% of its actual capacity, when all items are taken into account.
 4. Provide scaled floor plans, riser diagrams, factory wiring diagrams, field wiring diagrams indicating the wiring of all devices to include raceway size and routing, junction boxes, and conductor size, type and quantity in each raceway. Show their connections to other systems including but not limited to HVAC systems, elevator controls, access controls, and fire protection systems.
 5. Submit labeling scheme for typical alarm and supervisory points as they are to appear at the specified display points. Include all abbreviations for device types and operational areas.
 6. Provide specifications of all cable types labeled with their intended application.
 7. The Contractor shall not purchase any materials or equipment prior to receipt of approved shop drawings.

1.5 AS BUILT DRAWINGS AND OPERATION AND MAINTENANCE MANUALS:

- A. See Section See Section 26 0501 for other requirements.
- B. Submit redlined construction drawings to the Engineer to reflect all changes made during construction including floor plans, riser diagram, etc. The Engineer will transpose all reline marks into the Construction Drawings and provide corrected full size hard copies to the Owner.

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- C. Provide updated as-built shop drawings to reflect all changes made during construction including floor plans, riser diagram, etc. Submit both hard copies and electronic CADD files to the Owner, including and 11" x 17" set in the O & M books.

1.6 SYSTEM SOFTWARE:

- A. Provide all fire alarm system operational software to owner that will allow the owner to operate, maintain the systems and make changes, additions and deletions to system initiation devices. Format may be on flash drive.

1.7 SYSTEM DESCRIPTION:

- A. The fire alarm system shall be an addressable, programmable, intelligent system.
- B. Conduit routing and system wiring is not shown on the plans. It shall be the responsibility of the Electrical Contractor to coordinate with the fire alarm manufacturer to determine the conduit requirements (size and routing) and wiring required for system operation.
- C. The building's fire alarm system shall signal all system alarm, trouble and supervisory conditions to the remote monitoring station.
 - 1. All fire alarm systems shall be configured to delay the signaling of building trouble conditions signaling from the moment any trouble condition is detected as noted herein.
 - a. Trouble conditions:
 - 1) With exception of primary power failure trouble conditions, only trouble conditions that are sustained for periods that exceed 30 seconds shall signal the owner's designated remote monitoring station.
 - 2) Primary power failure trouble conditions that are sustained for periods of less than 2 hours **shall not** signal the owner's designated remote monitoring station (to avoid nuisance signaling during short term power failures, short term brownout conditions, etc.).
 - b. All supervisory conditions detected by the fire alarm systems shall signal owner's designated remote monitoring station immediately.
 - c. All alarm conditions detected by the fire alarm systems shall signal the owner's designated remote monitoring station immediately.
- D. Transient voltage surge protection (SPD) shall be provided as recommended by the manufacturer for all 120V inputs to fire alarm panels and on all signaling circuits at the FACP panel and where signaling circuits enter other buildings remote from the building in which the FACP panel resides.

1.8 SYSTEM OPERATION & CONFIGURATION:

- A. The system shall be electrically supervised non-presignal type.
- B. Operation of any manual or automatic device shall:
 - 1. Activate the audible and visual indicators and event message display at the local fire alarm control panel (FACP) and the remote FAA panel(s) indicating the status of the event, initiating device or zone.
 - 2. Activate remote station alarm, supervisory and trouble reporting procedure through the digital communicator and telephone system.
 - 3. Initiate the local emergency audible/visual evacuation signal throughout the building.
 - 4. The system may be "reset" to normal standby condition upon restoring the initiating device to "normal" and activating the "reset" switch on the FACP panel or the "reset" switch at the FAA Panel.
- C. All trouble and supervisory events shall cause the audible trouble signal to sound at the system control panels and remote annunciator panels.
- D. All system control panels, and remote annunciator panels shall display system events via liquid crystal display (LCD) screens.

1.9 ADDITIONAL CONTROL PANEL FUNCTIONS FOR ALL FACP PANELS

- A. General
 - 1. Provide controls at the fire alarm control panel's main display in the form of "toggle" style push buttons located behind the outer door of the FACP panel. The buttons shall be labeled with regards to the affect they have and the part of the system they affect. To activate these options, pressing the desired button once shall illuminate the amber LED beside the button. A status change in the system shall be annunciated by the main display and keypad. Pressing the button again shall deactivate the amber LED and the display shall cause this function to return to its previous state.
 - 2. Provide programmable control switches with amber "active" status LED indicators for the functions specified herein.
 - 3. The system shall allow any combination of these functions to be active at the same time to achieve desired system performance.
- B. Provide the following controls
 - 1. **Panel Disable** With this feature activated, the panel shall display all events or conditions currently active on the system; however, all outputs (relays, control modules, audible & visual notification appliances) shall be disabled, even in the event of an alarm. This is a global condition and affects the entire building.
 - 2. **HVAC Bypass (where applicable)** This option prevents the fire alarm from shutting down the building's air handlers in the event of an alarm. This is a global condition configured such that no matter where in the building an alarm is generated, the HVAC systems will not be shut down

by the fire alarm system. This is primarily used during system tests and inspections, when the system is being closely monitored, to prevent unwanted service interruptions.

3. **Output Functions Disable** This function shall completely disable all notification appliances, HVAC shutdown functions, and other local building system outputs. This mode of operation is used to test initiation devices without disruptions to the building occupants; and is intended for use when there is an operator at the panel and the system is being closely supervised.

1.9 POWER REQUIREMENTS

- A. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure.
- B. Provide battery chargers at all system panels as recommended by the system manufacturer. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel. All battery charging and recharging operations shall be automatic. The charging equipment shall be capable of recharging the batteries within 24 hours.
 1. With exception of batteries for amplifiers, all batteries shall be sized with 20% minimum spare capacity. "Derating" factors do not qualify as spare capacity.
- C. All circuits requiring system operating power shall be 24VDC and shall be individually fused at the control panel.
- D. Date marking of batteries
 1. All system batteries shall be permanently marked by the manufacturer with the month/year of manufacture using the month/year format.
 - a. Date-codes are not acceptable.
 2. All system batteries shall be marked with machine generated stick-on labels by the contractor with the month/day/year of installation

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Provide fire alarm system components and as manufactured by one of the following manufacturers (or approved equal):
 1. Notifier
 2. JCI-Simplex

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3. FCI
 4. Siemens-Designo
- B. The fire alarm system must be capable of being programmed by the Owner. All passwords and programming information shall be provided to the Owner.

2.2 GENERAL:

- A. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.

2.3 FIRE ALARM CONTROL UNITS (FACP):

- A. The Fire Alarm Control Panel shall be modular with solid state, microprocessor-based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition.
- B. Primary Keys and Panel Display:
1. The Control Panel's display (LCD) shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there should be keypad activity.
- C. Equipment Enclosures: Provide cabinet(s) of sufficient size to accommodate the aforementioned equipment. The cabinet(s) shall be equipped with locks and transparent door panel(s) providing freedom from tampering yet allowing full view of the various lights and controls.
- D. The maximum time period allowable between an alarm initiation and initiation of system notification appliances, remote reporting signal transmission, or control outputs shall be 10 seconds.
- E. All panel functions shall be field programmable.
- F. Remote reporting shall be provided via a digital cellular communicator (redundant communication path not required per 2019 NFPA-72, Part 26.6.3.3).
1. Provide a digital cellular alarm communicator (CDACT) capable of programmable point (device) transmission of fire alarm, supervisory and trouble signals to the UL Listed Central Station. The CDACT shall be programmed and configured to report alarm, trouble and supervisory signals based on individual initiation device point addresses as well as general system trouble conditions.
 2. Provide an exterior-mounted remote antenna (coordinate location with Engineer/Owner) as required for boosting signal strength. Provide coax cable as required in 3/4" conduit between the remote antenna and the communicator. Coordinate all work with the Owner and the Owner's remote monitoring station service provider.
- G. FACP panels shall be as follows:

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1. Notifier N16e
2. JCI-Simplex 4010ES
3. Gamewell FCI E3
4. Siemens-Desigo FC2025
5. Approved equal

2.4 ALARM NOTIFICATION DEVICES:

A. Alarm notification devices shall include:

1. Horn/strobes (combination audiovisual)
2. Strobes (visual only)

B. Audible and visual alarm devices shall meet the following requirements:

1. Strobes:

- a. Strobes shall be multi-candela type with field selectable candela ratings.

- 1) 15 cd
- 2) 30 cd
- 3) 75 cd
- 4) 95 cd
- 5) 110 cd
- 6) 135 cd
- 7) 177 cd

- b. Horns shall have at least two field selectable outputs (high/low) and shall be at least 91 dBA (Reverberant per U.L. Standard 464) measured at 10' on the high setting.

- c. Horn frequency shall be 1000Hz except for Dorm Rooms which have 520Hz horns.

C. Provide wall mounted or ceiling mounted devices as shown on the drawings.

1. Wall devices shall have white baffles with red "FIRE" lettering.
2. Ceiling mounted devices shall have white baffles with red "FIRE" lettering.

D. All visual devices shall have met the equivalent requirements of the Americans with Disabilities Act (ADA).

E. All devices shall mount on 4 x 4-inch or 2-gang electrical boxes. Box depth shall be coordinated with device supplier.

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- F. Devices shall be U.L. listed as weatherproof assemblies for outdoor applications exposed directly to weather with silicone sealing.

2.5 ALARM NOTIFICATION DEVICES:

- A. The Fire Alarm Control Panel shall be modular with solid state, microprocessor-based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition.
- B. Primary Keys and Panel Display:
 - 1. The Control Panel's display (LCD) shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there should be keypad activity.
- C. Equipment Enclosures: Provide cabinet(s) of sufficient size to accommodate the aforementioned equipment. The cabinet(s) shall be equipped with locks and transparent door panel(s) providing freedom from tampering yet allowing full view of the various lights and controls.
- D. The maximum time period allowable between an alarm initiation and initiation of system notification appliances, remote reporting signal transmission, or control outputs shall be 10 seconds.
- E. All panel functions shall be field programmable.
- F. Remote reporting shall be provided via a digital cellular communicator (redundant communication path not required per 2019 NFPA-72, Part 26.6.3.3).
 - 1. Provide a digital cellular alarm communicator (CDACT) capable of programmable point (device) transmission of fire alarm, supervisory and trouble signals to the UL Listed Central Station. The CDACT shall be programmed and configured to report alarm, trouble and supervisory signals based on individual initiation device point addresses as well as general system trouble conditions.
 - 2. Provide an exterior-mounted remote antenna (coordinate location with Engineer/Owner) as required for boosting signal strength. Provide coax cable as required in $\frac{3}{4}$ " conduit between the remote antenna and the communicator. Coordinate all work with the Owner and the Owner's remote monitoring station service provider.
- G. FACP panels shall be as follows:
 - 6. Notifier N16e
 - 7. JCI-Simplex 4010ES
 - 8. Gamewell FCI E3
 - 9. Approved equal

2.6 ADDRESSABLE DEVICE TYPES:

- A. General: The system control panels, over the two wire signaling channels, must be capable of communicating with the types of addressable devices specified below.
- B. Photo-electric Smoke Detectors:
 - 1. Photo-optic sensing chamber, UL listed to Standard 268.
 - 2. Low voltage, 2-wire solid state design incorporating tamper proof, plug-in head assembly.
 - 3. Intelligent addressable design with integral addressable transponder.
 - 4. Separate detector mounting base.
 - 5. Design to produce TROUBLE signal if detector head is removed from its mounting base and ALARM signal if detection chamber is removed.
 - 6. LED that blinks when sensor is being polled and glows steadily when in alarm.
- C. Automatic heat detectors: Combination rate-of-rise and fixed temperature type.
 - 1. Combination rate-of-rise and fixed temperature type (135 degrees F threshold), automatically restorable.
 - 2. Low voltage, 2-wire solid state design incorporating tamper proof, plug-in head assembly.
 - 3. Intelligent addressable design with integral addressable transponder.
 - 4. Separate detector mounting base.
 - 5. Design to produce TROUBLE signal if detector head is removed from its mounting base and ALARM signal if detection chamber is removed.
 - 6. LED that blinks when sensor is being polled and glows steadily when in alarm.
- D. Automatic fire detectors for ductwork:
 - 1. Provide intelligent, addressable type photo-electric smoke detectors as specified herein.
 - 2. Duct accessories:
 - a. Cast metal construction, with pre-cut keyed air sampling.
 - b. Provide a remote red LED alarm lamp with key test station for each duct detector below each detector. Wire each alarm LED to its respective detector. Label each test station with the respective air handler designation.

2.7 CONTROL MODULES:

- A. Addressable (field programmable).
- B. Contacts shall be form "C", rated at 2A, 24 VDC and 0.5A, 120 VAC.

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2.8 MONITORING MODULES:

- A. Addressable (field programmable).

2.9 REMOTE ANNUNCIATOR PANEL (LCD DISPLAY TYPE):

- A. Where shown on the plans, provide and install a text message display type annunciator. FAA panels shall be wall mounted in a flush style enclosure 54" AFF (measured to top of highest control switch) where shown on the plans.
- B. All FAA annunciator panels shall have the following features:
 - 1. Microprocessor based with EPROM memory buffer.
 - 2. Trouble buzzer.
 - 3. Back-Lit, 80-character liquid crystal display (LCD) screen (alpha/numeric).
 - 4. Indicator L.E.D.'s:
 - a. Normal
 - b. Alarm
 - c. Supervisory
 - d. Trouble
 - 5. Password enabled control of all panel control functions.
- C. Provide supervised 24VDC power to the FAA panel from the host FACP panel.

2.10 SYSTEM WIRING:

- A. General:
 - 1. All signaling circuit cables shall be provided as follows.
 - a. NEC Type FPL for all non-riser type cables (U.L. listed for fire alarm use).
 - b. Minimum size shall be #18AWG.
 - 2. All horizontal circuits serving notification appliances, and 24VDC powered devices shall be provided as follows (manufacturer's requirements shall take priority):
 - a. NEC Type FPL, manufactured specifically for fire alarm system applications.
 - b. 600V, THWN insulated wiring.
 - c. Minimum size shall be #14AWG.
- B. Initiation device signaling circuit pathways shall be Class B.
 - 1. Floor-to-floor initiation device signaling circuit cable shall be FPLR type as classified by NEC Article 760.
- C. Signaling circuit pathways shall be Class B.

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- D. Audible/visual notification appliance circuit pathways shall be Class B.
- E. Notification appliance circuit pathways shall be Class B.
- F. All circuits shall be protected (power limited) as required per NFPA 70 to allow notification circuits to be installed in the same conduit as initiation and signaling circuits.
- G. Fire Alarm circuits may be solid or stranded as recommended by the equipment manufacturer for each specific application.

2.11 AS-BUILT AND O & M CABINET:

- A. Provide a heavy duty red hinged cabinet with locking door adjacent to the FACP panel (not shown on drawings) for NFPA-72 Record of Completion and for storage of the on-site fire alarm as-built drawings and O & M manual.
- B. The cabinet shall be a surface type enclosure constructed of 16 gauge cold rolled steel and shall be finished with a durable red textured, heat- resistant baked-on enamel finish.
- C. The cabinet door shall have a stainless-steel piano hinge and a high security keyed door lock. The lock shall be keyed like the fire alarm cabinet.
- D. The cabinet shall have a factory mounted code/graphic frame mounted on the door to house the required NFPA-72 certification and testing documents.
 - 1. The frame shall be 8.75" X 11.125" and shall be manufactured from 18-gauge steel with a baked-on red paint finish.
 - 2. The frame shall be provided with a shatter proof Lexan glass.
- E. Dimensions:
 - 1. Cabinet: 26-1/4" W x 14-1/4" H x 4" D
 - 2. Door: 8-1/2" W x 11" H
- F. Model:
 - 1. Cabinet: Space Age #SSU00677 (or approved equal)
 - 2. Door: Space Age #SSU52010 (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL:

- A. NFPA-72 COMPLIANCE AND INSTALLATION QUALIFICATIONS:
 - 1. The installed fire alarm system shall meet all applicable requirements of NFPA-72 for a Local Fire Alarm System.

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2. Installation and testing of all fire alarm system devices, equipment, and wiring shall be performed by a qualified electronics contractor licensed specifically for signal systems installation.
- B. The Contractor is responsible for assuring that conduit size and wire quantity, size, and type is suitable for the equipment supplied. The Contractor shall review the proper installation of each type of device with the equipment supplier.
- C. All wiring shall be installed in concealed conduit.
- D. Unless otherwise noted, all devices shall be flush mounted.
- E. Make all fire alarm wiring continuously from control panel (or power extender panel) to device terminals. T-taps are not allowed.
- F. Smoke detectors shall not be located any closer than 3'-0" from any ceiling type HVAC supply or return air grille.

3.2 CONTROL MODULES:

- A. Control modules shall be installed within 18 inches of their associated devices to be controlled and in a readily accessible location.

3.3 MONITORING MODULES:

- A. Monitoring modules shall be installed within 24 inches of their associated devices to be controlled and in a readily accessible location.

3.4 PROGRAMMING:

- A. The system installer shall provide complete programming for all systems whether programming is factory installed or installed in the field by the system installer.
- B. The system installer shall derive all user specified programming information (building designations, room descriptions, etc.) from the actual room names and numbers not the drawings. Obtain proposed room name designations from the signage schedule provided by the Owner. Verify with all changes with the Owner prior to programming.
- C. All programming changes required by the Owner to render the system usable and functional by the Owner's standards shall be made at the contractor's expense.

3.5 PANEL LABELING:

- A. All control panels, power extender panels and annunciator panels shall be permanently labeled with their respective panel designations in accordance with general Division 26 labeling requirements.

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- B. All Fire Alarm panels powered with 120V A.C. power shall be permanently labeled with the following information in accordance with general Division 26 labeling requirements.
 - 1. Room name/number containing the 120V panelboard feeding the fire alarm panel.
 - 2. Host 120V branch circuit panelboard and branch circuit number designation.

3.6 120V BRANCH CIRCUIT BREAKER LOCK-OUT, MARKING, AND LABELING:

- A. All 120V branch circuit breaker handles serving fire alarm panels shall be provided with a "lock-out" type accessory per NFPA-72 requirements with a pad lock (keyed alike - furnish ten keys to the Owner) that allows the circuit breaker to be locked in the "ON" position and allow the circuit breaker to trip in an overload condition.
- B. All 120V branch circuit breaker handles serving fire alarm panels shall be permanently marked with red color per NFPA-72 requirements.
- C. The 120V panelboard index circuit designations for all 120V branch circuit panelboards serving fire alarm panels shall be identified typically "FIRE ALARM CIRCUIT-FACP" & "FIRE ALARM CIRCUIT-FPE", etc. per NFPA-72 requirements.

3.7 TESTING, GUARANTEE, SERVICE:

- A. Provide initial certification testing of the system in accordance with the procedures outlined in NFPA 72.
- B. Document all testing in accordance with the National Fire Alarm Code. Submitted documentation shall include but shall not be limited to the following items:
 - 1. Fully completed NFPA-72 Record of Completion form (2019 Edition).
 - 2. Fully completed NFPA-72 Inspection and Testing form (2019 Edition).
- C. Upon completion, the Contractor shall conduct a functional test of the entire system for the Authority Having Jurisdiction, Owner and Engineer.
 - 1. Additional testing and demonstration for the Authority Having Jurisdiction, Owner and Engineer shall be provided as required until the system is demonstrated to be free of unexplained alarms, troubles, faults, or any abnormalities.
- D. In the event that additional software programming is necessary to complete the tests, the system shall be completely retested as outlined in this section at the contractor's expense.

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- E. All components, parts and assemblies supplied by the manufacturer shall be guaranteed by the manufacturer against defects in materials and workmanship for a period of one (1) year.
- F. The equipment manufacturer shall have a local branch office or authorized factory distributor staffed with trained, full-time employees who are capable of performing testing, inspection, repair, and maintenance services for the life of the fire alarm system.

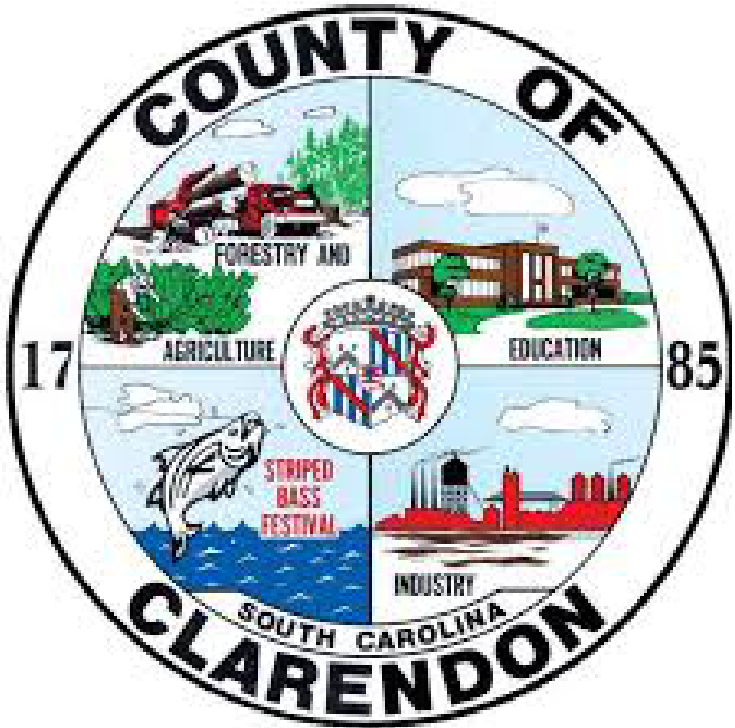
3.8 COMPLETION:

- A. Certification:
 - 1. The contractor shall certify in a letter to the Engineer that the complete system has been checked in accordance with the required NFPA-72 testing standards and has been installed in accordance with the contract documents and that all items have been labeled. Complete and submit at least three (3) working days prior to acceptance test, the NFPA-72 forms required for the installed system.
- B. A factory representative shall provide a minimum of 2 hours of owner training in the complete operation and maintenance of the fire alarm system. Final training schedule shall be scheduled with the Owner before building acceptance.

3.9 KEYS:

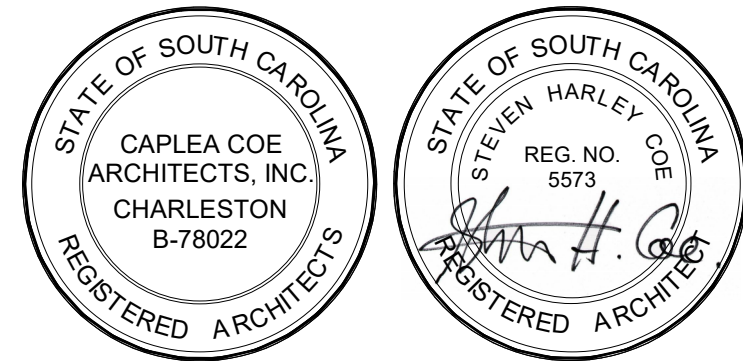
- A. Keys and locks for all equipment shall be identical where possible. Provide not less than six keys of each type required.

END OF SECTION 28 31 11



CLARENDON COUNTY EMERGENCY MANAGEMENT & 911 COMMUNICATIONS DISPATCH CENTER

1091 CAPITAL WAY
MANNING, SC 29102



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- NOTES:
- GC TO PERFORM AAMA A502 WATER SPRAY TESTS ON (3) WINDOWS IN PLACE. ARCHITECT TO SELECT THE WINDOWS TO BE TESTED
 - ALL GUTTERS TO DISCHARGE ONTO CONCRETE SPLASHBLOCK, TYP. & PROVIDE POSITIVE SLOPE AWAY FROM BUILDING
 - SEE A512 FOR FREE-STANDING MOCKUP
 - ALL TOILET ACCESSORIES ARE OF CGL GC TO FINALIZE OWNERS SELECTIONS & COORDINATE LOCATIONS PRIOR TO INSTALLING GWB
 - TACK BOARDS & MARKER BOARDS ARE OF OPL GC TO COORDINATE LOCATIONS FOR BLOCKING PRIOR TO INSTALLING GWB

ARCHITECTS / ENGINEERS / CONSULTANTS:

ARCHITECT:
CAPLEA COE ARCHITECTS, INC.
1643 MEANS STREET
CHARLESTON, SC 29412
(843) 577-6073

MEP ENGINEER:
BUFORD, GOFF, & ASSOCIATES
1331 ELMWOOD AVENUE, SUITE 200
COLUMBIA, SC 29201
(803) 254-6302

STRUCTURAL ENGINEER:
MMSA, INC.
30 PATEWOOD DRIVE, SUITE 100
GREENVILLE, SC 29615
(864) 331-1201

CIVIL ENGINEER:
HUSSEY GAY BELL
1010 GERVAIS STREET, FLOOR 3
COLUMBIA, SC 29201
(803) 799-0444

TECHNOLOGY:
WIRED ENGINEERING, LLC.
4327 S. HWY 27
CLERMONT, FL 34711
(407) 716-9711

COMMISSIONING:
MBP CAROLINAS, INC.
4700 FALLS OF NEUSE RD.
SUITE 370
RALEIGH, NC 27609
919-875-0124

CODE SUMMARY

- SITE DEVELOPMENT:
 - TOTAL AREA OF PROJECT SITE (IN ACRES): .99
 - TOTAL AREA OF PROJECT SITE THAT WILL BE DEVELOPED: .99 ACRES
 - MUNICIPALITY AND/OR COUNTY WHERE PROJECT IS LOCATED: **MANNING, SC**
 - JURISDICTION FOR:
 - SITE WORK: **CITY OF MANNING**
 - FIRE DEPARTMENT: **CLARENDON COUNTY EMERGENCY MANAGEMENT**
 - WATER: **CITY OF MANNING**
 - SEWER: **CITY OF MANNING**
 - ZONING: **PL-2**
 - IS PROJECT IN A FLOOD ZONE: **NO**
FLOOD MAP INFORMATION: **MAP# 455413**
EFFECTIVE DATE: **NOV. 17, 2004**
COMMUNITY PANEL: **0529**
 - IS PROJECT IN WETLANDS AREA: **YES**
 - OCCUPANCY: **BUSINESS (B), ASSEMBLY (A-3), RESIDENTIAL (R-3)**
 - TYPE OF CONSTRUCTION:
 - CONSTRUCTION CLASSIFICATION: **TYPE II B**
 - IS THE BUILDING CONSTRUCTION PROTECTED OR UNPROTECTED: **UNPROTECTED**
 - IS THE BUILDING CONSTRUCTION COMBUSTIBLE OR NONCOMBUSTIBLE: **NONCOMBUSTIBLE**
 - IS THE BUILDING PROVIDED WITH A FIRE PROTECTION SPRINKLER SYSTEM? **YES**
 - GENERAL BUILDING DESIGN: ALLOWABLE AREA, HEIGHT AND OCCUPANT LOAD:
 - BUILDING TOTAL AREA = **ALLOWABLE 48,000 GSF; ACTUAL 10,300 GSF**
 - HEIGHT = **ALLOWABLE 75' - 0"; ACTUAL 28' - 8"**
 - OCCUPANT LOAD = **237 PERSONS TOTAL**
GROUP B BUSINESS: 5,526 SF / 150 GROSS SF PER PERSON = 37 PERSONS
GROUP A-3 ASSEMBLY: 2,627 SF / 15 GROSS SF PER PERSON = 176 PERSONS
GROUP R-3 RESIDENTIAL: 1,197 SF / 50 GROSS SF PER PERSON = 24 PERSONS
 - FIRE RESISTANCE RATINGS
 - STRUCTURAL FRAME = **0**
 - BEARING WALLS/EXTERIOR = **0**
 - BEARING WALLS/INTERIOR = **0**
 - NONBEARING WALLS/EXTERIOR = **0**
 - NONBEARING WALLS/INTERIOR = **0**
 - FLOOR CONSTRUCTION = **0**
 - ROOF CONSTRUCTION = **0**
 - FIRE WALLS = **N/A**
 - FIRE BARRIERS = **N/A**
 - SHAFT ENCLOSURES = **N/A**
 - FIRE PARTITIONS = **1 HR**
 - OTHER FIRE PROTECTION REQUIREMENTS:
 - ARE SMOKE BARRIERS REQ'D? **NO**
 - SMOKE PARTITIONS REQ'D? **NO**
 - PROTECTION OF PENETRATIONS REQ'D? **YES**
 - ARE PENETRATIONS PER UL TESTING AUTHORITY? **YES**
 - OPENING PROTECTIVES REQ'D? **NO**
 - IS DRAFT STOPPING REQ'D? **NO**
 - IS FIRE BLOCKING REQ'D? **NO**
 - ARE SPRINKLERS REQ'D? **NO** PROVIDED? **YES**
 - ARE STANDPIPES REQ'D? **NO**
 - IS A FIRE ALARM SYSTEM REQ'D? **YES**
 - IS A SMOKE CONTROL SYSTEM REQ'D? **NO**
 - STRUCTURAL DESIGN INFORMATION: **SEE S100**
 - FLOOR LIVE LOAD: **125 PSF LIGHT STORAGE, 150 PSF MECHANICAL/ELECTRICAL, 100 PSF ALL OTHER AREAS**
 - ROOF LIVE LOAD: **20 PSF**
 - GROUND SNOW LOAD: **5 PSF**
 - WIND LOADS: **ASCE 7-16**
BASIC WIND SPEED, $V = 144$ (3-sec gust in mph)
BUILDING CATEGORY = **CATEGORY IV, ESSENTIAL FACILITY**
WIND EXPOSURE = **EXPOSURE C**
COMPONENT AND CLADDING MAX PRESSURE = **47.2 PSF (ULT)**
 - SEISMIC LOADS: **ASCE 7-16**
SEISMIC IMPORTANCE FACTOR, $I_E = 1.5$
SEISMIC USE GROUP = **IV**
MAPPED SPECTRAL RESPONSE ACCELERATIONS:
SITE CLASS = **D**
SPECTRAL RESPONSE COEFFICIENT: $S_{ds} = 0.487g$ $S_{d1} = 0.256g$
SEISMIC DESIGN CATEGORY = **CATEGORY D**
BASIC SEISMIC FORCE RESISTING SYSTEM = **STEEL ORDINARY CONCENTRICALLY BRACED FRAMES & SPECIAL REINFORCED MASONRY SHEAR WALLS**
ANALYSIS PROCEDURE: **EQUIVALENT LATERAL FORCE**
 - SPECIAL LOADS:
 - WATER SYSTEM: DOMESTIC, FIXTURE UNITS: **152 WFSU** PEAK GPM: **83 gpm** SERVICE LINE SIZE: **3"**
 - SANITARY SEWER SYSTEM LOADING: **118 DFU - (1) 4" SEWER MAIN SLOPED @ 0.125" PER FOOT**
 - EXISTING SERVICE LINE SIZE: **N/A**
 - PLUMBING FIXTURE CALCULATIONS:
MINIMUM NUMBER OF PLUMBING FIXTURES REQUIRED:
BUSINESS OCCUPANCY = 37 OCCUPANTS (19 MALE, 19 FEMALE)
WATER CLOSETS (MALE & FEMALE): 1 PER 25 FOR FIRST 50, 1 PER 50 REMAINDER = **2 WC**
LAVATORIES (MALE & FEMALE): 1 PER 40 FOR FIRST 80, 1 PER 80 REMAINDER = **2 LAV**
A-3 ASSEMBLY OCCUPANCY = 176 OCCUPANTS (88 MALE, 88 FEMALE)
WATER CLOSETS (MALE): 1 PER 125 = **1 WC**
WATER CLOSETS (FEMALE): 1 PER 65 = **2 WC**
LAVATORIES (MALE & FEMALE): 1 PER 200 = **2 LAV**
R-3 RESIDENTIAL OCCUPANCY = 24 OCCUPANTS (12 MALE, 12 FEMALE)
WATER CLOSETS (MALE & FEMALE): 1 PER 10 = **4 WC**
LAVATORIES (MALE & FEMALE): 1 PER 10 = **2 LAV**
SHOWERS (MALE & FEMALE): 1 PER 8 = **3 SHOWERS**
- TOTALS: **WATER CLOSETS REQUIRED: MALE = 4, FEMALE = 5; PROVIDED: MALE = 2 WC(+ 2 URINAL), FEMALE = 5, UNI = 3**
LAVATORIES REQUIRED: MALE = 3, FEMALE = 3; PROVIDED: MALE = 3, FEMALE = 4, UNISEX = 3
SHOWERS REQUIRED: 3; PROVIDED: 3
SERVICE SINKS REQUIRED: 1; PROVIDED: 1
DRINKING FOUNTAINS REQUIRED: 1; PROVIDED: 2
- MECHANICAL INFORMATION:
 - OVERALL THERMAL TRANSFER VALUE (OTTV): FUTURE CALCULATION - **2.6 BTU/FT²**
 - COOLING LOAD: **75 TONS**
 - HEATING LOAD: **681.8 MBH**
 - OUTSIDE AIR (CFM/PERSON): 4600 CFM TOTAL, 77 PEOPLE, FOR 59 CFM/PERSON
 - INSULATION R-VALUE: EXT. WALLS: R19 ROOF: R30
 - GLASS: U-FACTOR: **WINTER NIGHT TIME = 0.6 max. SUMMER DAYTIME = 0.6 max. SHGC: 0.29 max.**
WINDOW-TO-WALL RATIO: 3%
- ELECTRICAL INFORMATION:
 - SERVICE TRANSFORMER:
IF BY AGENCY: **BY UTILITY** KVA: **BY UTILITY** PRIMARY VOLTAGE/PHASE: **BY UTILITY**
 - PROVIDE THE FOLLOWING SERVICE INFORMATION:
SERVICE VOLTAGE/PHASE: **208V, 3-PHASE** AMPERES: **1600 A**
SERVICE ENTRANCE CONDUCTORS SIZE: **400 MCM**
QUANTITY PER PHASE: **5**
TOTAL CONNECTED LOAD KVA: **425** ESTIMATED DEMAND FACTOR: **0.90**
ESTIMATED MAXIMUM DEMAND KVA: **382**
AVAILABLE FAULT CURRENT IN SYMMETRICAL AMPERES: **99,997A AT SERVICE DISCONNECT**
INTERRUPTING CAPACITY OF SERVICE OVERCURRENT DEVICE: **30,000**
TYPE OF GROUNDING ELECTRODE SYSTEM(S) PER NEC 250-C: **PER NFPA 70, ARTICLE 250**
ENCASED ELECTRODE, DRIVEN ROD, GROUND RING
- EMERGENCY GENERATOR: **YES** VOLTAGE/PHASE: **208V, 3-PHASE** FUEL: **DIESEL**
- EXT-EMERGENCY LIGHTS BACKUP POWER: **GENERATOR**
- EMERGENCY EGRESS ILLUMINATION MINIMUM FOOT-CANDLES: **PER SCBC 2021 - 1fc**
- FIRE ALARM SYSTEM: ADDRESSABLE? **YES** CLASS A OR B? **B**
- LIGHTNING PROTECTION PROVIDED? **YES**

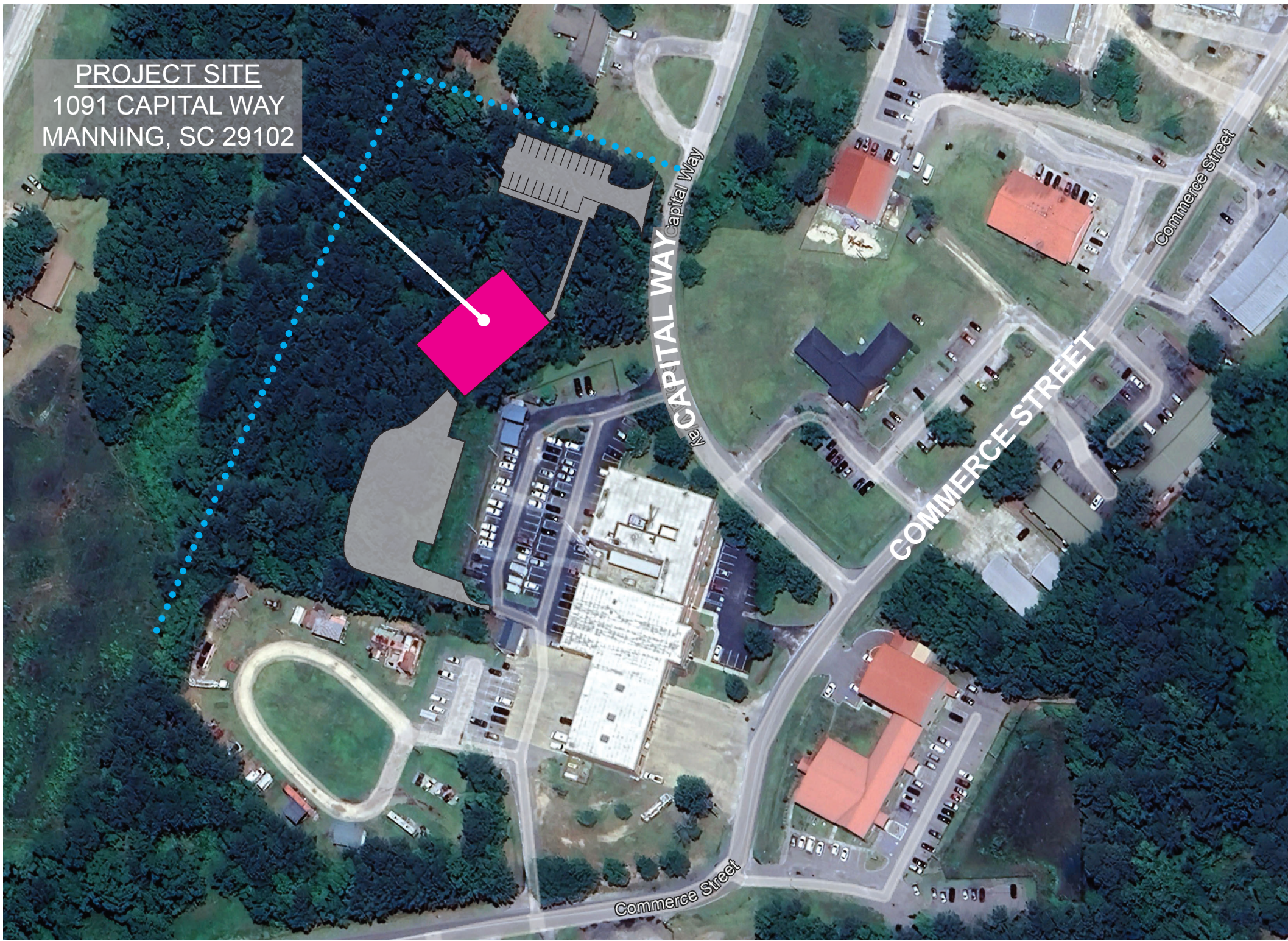
LIST OF DRAWINGS

SHEET	SHEET NAME	REV.	DATE	SHEET	SHEET NAME	REV.	DATE
01 GENERAL				E002	ONE-LINE DIAGRAM - MAIN SERVICE		
G100	TITLE SHEET	1	05/13/25	E003	ONE-LINE DIAGRAM - UPS SYSTEM		
G101	ABBREVIATIONS, LEGEND, & CONDOC			E004	PANELBOARD SCHEDULES		
G102	ADA DETAILS			E005	PANELBOARD SCHEDULES		
				E006	PANELBOARD SCHEDULES		
02 LIFE SAFETY				E100	LIGHTING DETAILS		
LS101	FIRST FLOOR LIFE SAFETY PLAN			E101	FIRST FLOOR PLAN		
				E200	ELECTRICAL DETAILS		
03 CIVIL				E201	FIRST FLOOR PLAN - ELECTRICAL		
C000	COVER & INDEX SHEET			E202	MECH. PLATFORM - ELECTRICAL		
C100	EXISTING CONDITIONS & DEMOLITION PLAN			E210	ENLARGED FLOOR PLANS - ELECTRICAL		
C200	SITE PLAN			E211	CALL CENTER POWER SYSTEM ANNUNCIATION		
C201	SITE DETAILS			E250	OVERALL ROOF PLAN - LIGHTNING PROTECTION SYSTEM		
C202	SITE DETAILS			E300	FIRE ALARM DETAILS		
C300	GRADING & DRAINAGE PLAN			E301	FIRST FLOOR PLAN - FIRE ALARM		
C301	STORMWATER DETENTION POND DETAILS			E401	FIRST FLOOR PLAN - EMERGENCY RESPONDER RADIO COVERAGE (ERRC)		
C302	STORM DRAINAGE DETAILS						
C303	STORM DRAINAGE DETAILS						
C304	STORM DRAINAGE DETAILS						
C400	WATER & SANITARY SEWER PLAN			10 FIRE PROTECTION			
C401	WATER & SANITARY SEWER DETAILS			F001	LEGENDS, NOTES, & SCHEDULES - FIRE PROTECTION		
C501	SWPPP PHASE 1 - INITIAL PHASE			F100	FIRST FLOOR PLAN - FIRE PROTECTION		
C502	SWPPP PHASE 2 - CONSTRUCTION PHASE			F500	DETAILS - FIRE PROTECTION		
C503	SWPPP PHASE 3 - STABILIZATION PHASE			F501	ENLARGED PLANS & SCHEMATICS - FIRE PROTECTION		
C504	SWPPP DETAILS						
C505	SWPPP DETAILS			11 TECHNOLOGY			
C506	SWPPP DETAILS			T001	GENERAL NOTES & SHEET INDEX		
				T002	RESPONSIBILITY MATRIX		
04 LANDSCAPE				T101	VOICE / DATA FLOOR PLAN		
L100	LANDSCAPE SHEET KEY			T102	SECURITY FLOOR PLAN		
L101	LANDSCAPE PLAN			T103	A/V FLOOR PLAN		
L102	LANDSCAPE PLAN			T104	REFLECTED CEILING PLAN		
L103	LANDSCAPE PLAN			T201	TECHNOLOGY ENLARGED PLANS		
L104	LANDSCAPE PLAN			T301	TECHNOLOGY RISER DIAGRAMS		
L105	NOTES, DETAILS & MASTER SCHEDULE			T302	TECHNOLOGY RISER DIAGRAMS		
				T401	TECHNOLOGY DETAILS		
				T402	TECHNOLOGY DETAILS		
				T501	DEVICE SCHEDULES		
05 ARCHITECTURAL							
A100	EDGE OF SLAB PLAN						
A101	FIRST FLOOR PLAN	1	05/13/25				
A102	FIRST FLOOR DIMENSION PLAN						
A110	ROOF PLAN						
A124	TYPICAL SEISMIC CEILING DETAILS						
A201	EXTERIOR ELEVATIONS	1	05/13/25				
A202	EXTERIOR ELEVATIONS						
A301	BUILDING SECTIONS						
A302	BUILDING SECTIONS						
A310	WALL SECTIONS						
A311	WALL SECTIONS						
A312	WALL SECTIONS						
A313	WALL SECTIONS						
A320	SECTION DETAILS						
A321	SECTION DETAILS						
A401	ENLARGED PLANS & INTERIOR ELEVATIONS	1	05/13/25				
A402	ENLARGED PLANS & INTERIOR ELEVATIONS	1	05/13/25				
A403	INTERIOR ELEVATIONS	1	05/13/25				
A404	INTERIOR ELEVATIONS	1	05/13/25				
A405	INTERIOR ELEVATIONS						
A501	CASEWORK SECTIONS	1	05/13/25				
A502	CASEWORK SECTIONS						
A510	DETAILS						
A511	MOCK-UP PANEL						
A601	DOOR SCHEDULE & LEGENDS	1	05/13/25				
A602	STOREFRONT LEGEND						
A603	HEAD, JAMB, & SILL DETAILS						
A604	SIGNAGE						
A621	PARTITION TYPES						
A623	WALL, FLOOR, & ROOF TYPES						
A700	FIRST FLOOR FINISH PLAN						
A701	FINISH SCHEDULES						
A901	RENDERING						
A902	RENDERING						
A903	RENDERING						
A904	RENDERING						
06 STRUCTURAL							
S001	GENERAL NOTES						
S002	BASIS OF DESIGN						
S101	FOUNDATION / SLAB PLAN						
S201	ROOF FRAMING PLAN						
S202	HIGH ROOF FRAMING PLAN						
S301	SECTIONS AND DETAILS						
S302	SECTIONS AND DETAILS						
S401	SECTIONS AND DETAILS						
S402	SECTIONS AND DETAILS						
S501	MASONRY DETAILS						
S601	BRACING ELEVATIONS						
S602	BRACING DETAILS						
S603	SECTIONS AND DETAILS						
07 MECHANICAL							
M001	HVAC SCHEDULES						
M002	HVAC SCHEDULES						
M100	FIRST FLOOR PLAN - HVAC						
M110	ROOF PLAN - HVAC						
M400	DETAILS - HVAC						
M401	DETAILS - HVAC						
08 PLUMBING							
P001	PLUMBING NOTES, LEGENDS, & SCHEDULES						
P002	PLUMBING SCHEDULES & DETAILS						
P101	FLOOR PLAN - PLUMBING - SUPPLY						
P102	FLOOR PLAN - PLUMBING - WASTE / VENT						
P110	ROOF PLAN - PLUMBING						
P200	PLUMBING - WASTE / VENT RISER						
09 ELECTRICAL							
E001	SITE PLAN						

AGENCY APPROVALS

AGENCY	APPROVAL	DATE
SCDEHC	STORMWATER MANAGEMENT	04/18/2025

LOCATION MAP



APPLICABLE CODES

ENFORCED CODES:

2021 INTERNATIONAL EXISTING BUILDING CODE WITH S.C. MODIFICATIONS
2021 INTERNATIONAL BUILDING CODE WITH S.C. MODIFICATIONS
2021 INTERNATIONAL MECHANICAL CODE WITH S.C. MODIFICATIONS 2021
2020 NATIONAL ELECTRIC CODE WITH S.C. MODIFICATIONS
2021 INTERNATIONAL PLUMBING CODE WITH S.C. MODIFICATIONS
INTERNATIONAL FIRE CODE, 2021 ED. WITH S.C. MODIFICATIONS
2021 INTERNATIONAL FUEL GAS WITH S.C. MODIFICATIONS

INTERNATIONAL ENERGY CONSERVATION CODE (IECC), 2009 ED. (ENERGY STANDARD ACT)

NFPA 70-2020, NATIONAL ELECTRIC CODE WITH S.C. MODIFICATIONS

LATEST EDITION OF ICC/ANSI-A117.1-2017 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
ADOPTED BY THE ACCESSIBILITY ACT, S.C. CODE ANN. § 10-5-210 ET SEQ.

*[SCBC MODIFICATIONS: SEC 305.4.1, INSERT "18" AND INSERT "18", SEC 903.1, INSERT "8"]

CONTRACT DOCUMENTS

CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

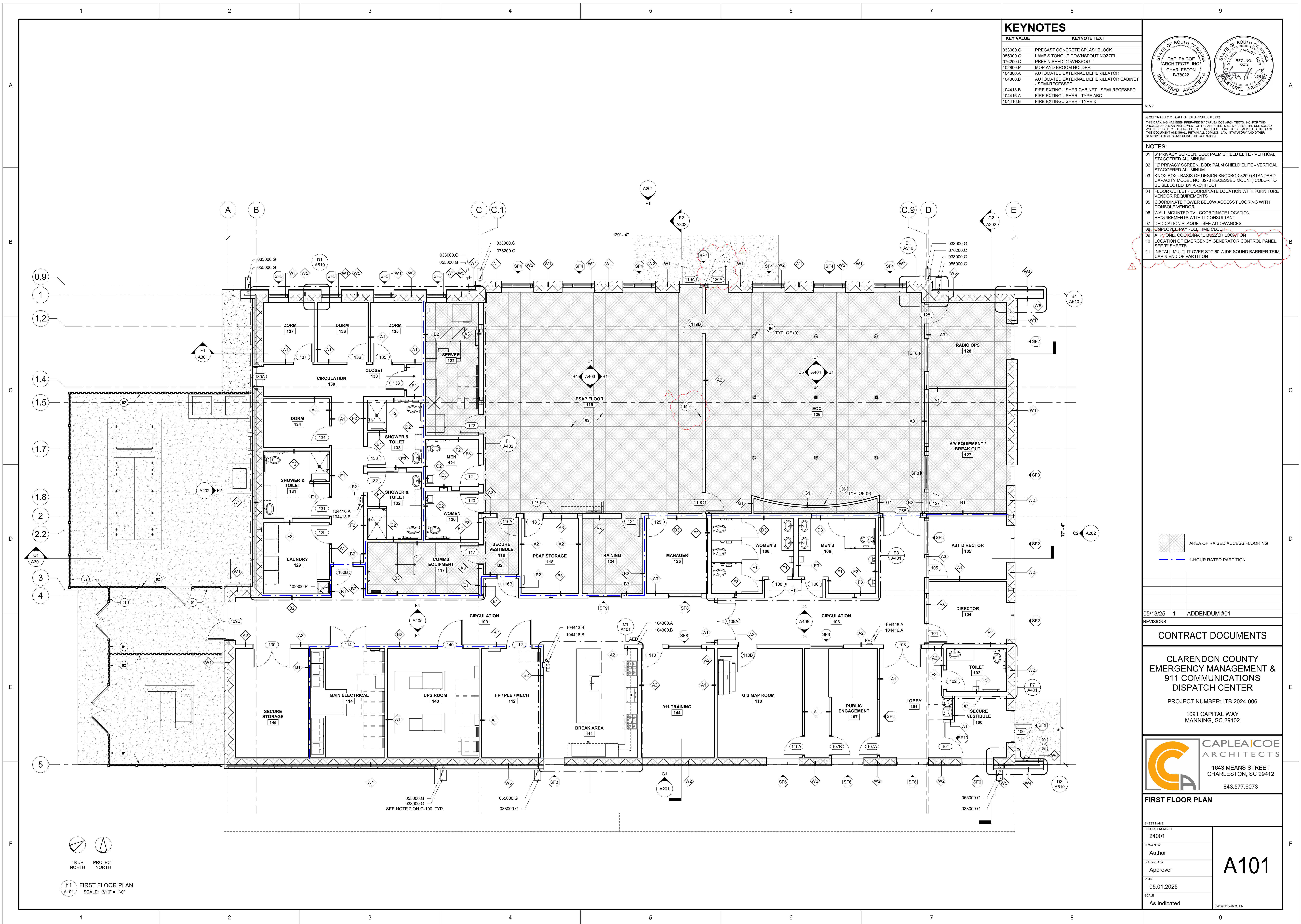
1091 CAPITAL WAY
MANNING, SC 29102



CAPLEA COE
ARCHITECTS
1643 MEANS STREET
CHARLESTON, SC 29412
843.577.6073

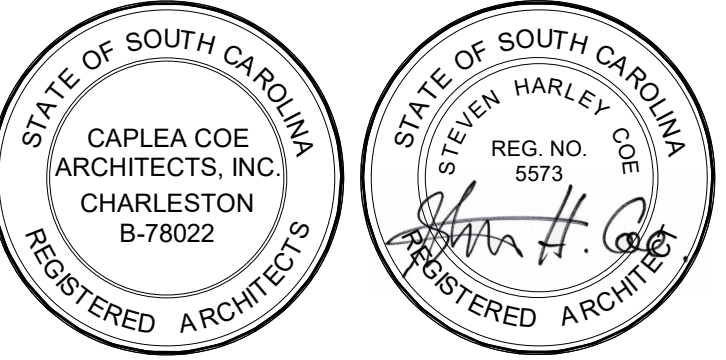
TITLE SHEET

SHEET NAME	PROJECT NUMBER	G100
24001		
DRAWN BY		
CHECKED BY		
DATE	05.01.2025	
SCALE		
		6/20/2025 4:02:28 PM



KEYNOTES

KEY VALUE	KEYNOTE TEXT
076200.B	PREFINISHED GUTTER
076200.E	PREFINISHED BRAKE METAL FASCIA
107300.G	ALUMINUM CANOPY
122413.A	ROLLER WINDOW SHADES



SEALS

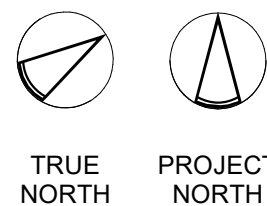
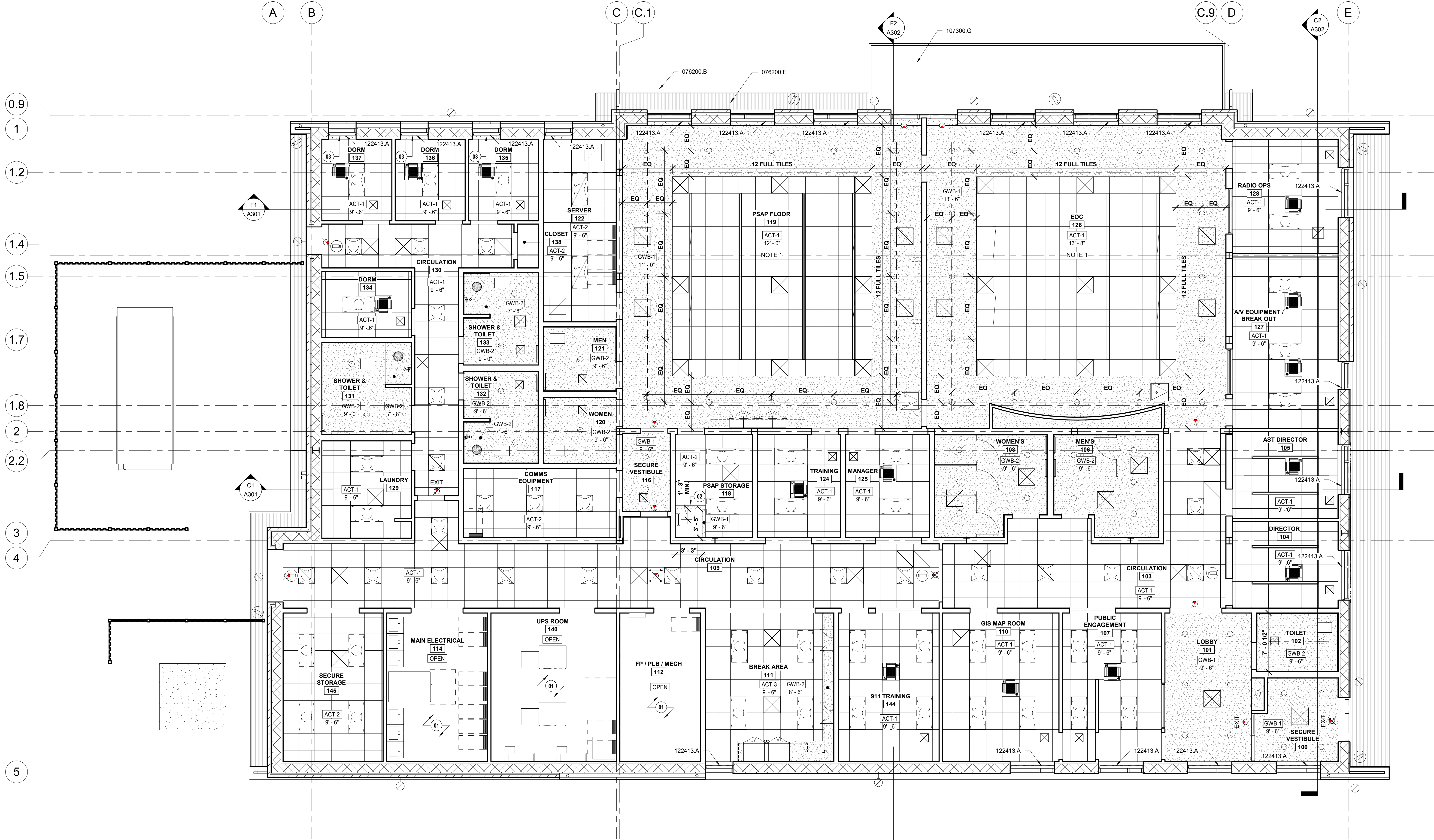
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NOTES:

- 01 DRYFALL PAINT AT EXPOSED STRUCTURE, DECK, & SPRINKLER PIPE IN THIS ROOM
- 02 GWB SOFFITS @ ROOF LADDER TO ATTACH TO UNDERSIDE OF DECK
- 03 DORM ROOMS TO HAVE BLACKOUT SHADES. REFER TO SPECIFICATIONS.

GENERAL NOTES:

1. ALL EXTERIOR WINDOWS TO RECEIVE ROLLER SHADES. REFER TO SPECIFICATIONS FOR TYPE



F1 FIRST FLOOR REFLECTED CEILING PLAN
SCALE: 3/16" = 1'-0"

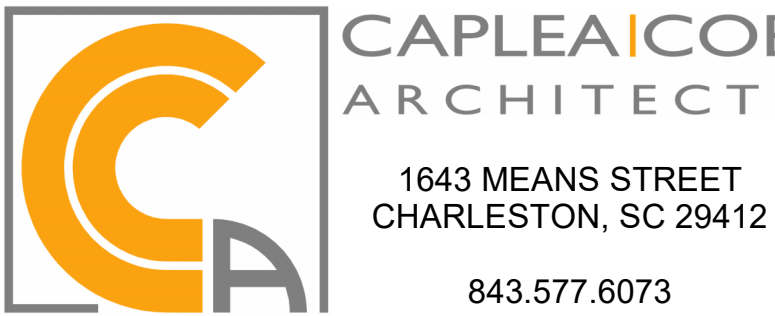
05/13/25 1 ADDENDUM #01
REVISIONS

CONTRACT DOCUMENTS

CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

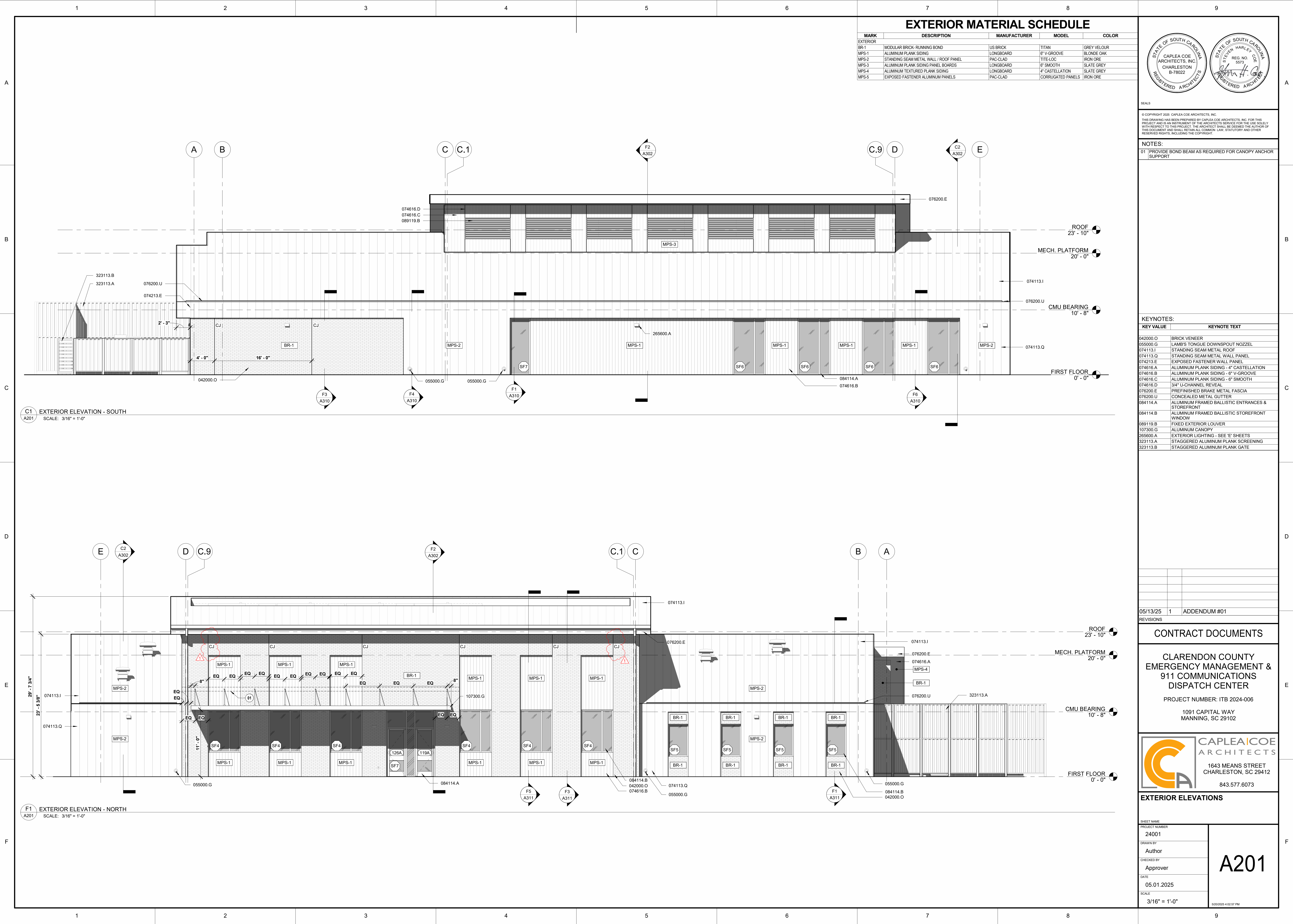
1091 CAPITAL WAY
MANNING, SC 29102

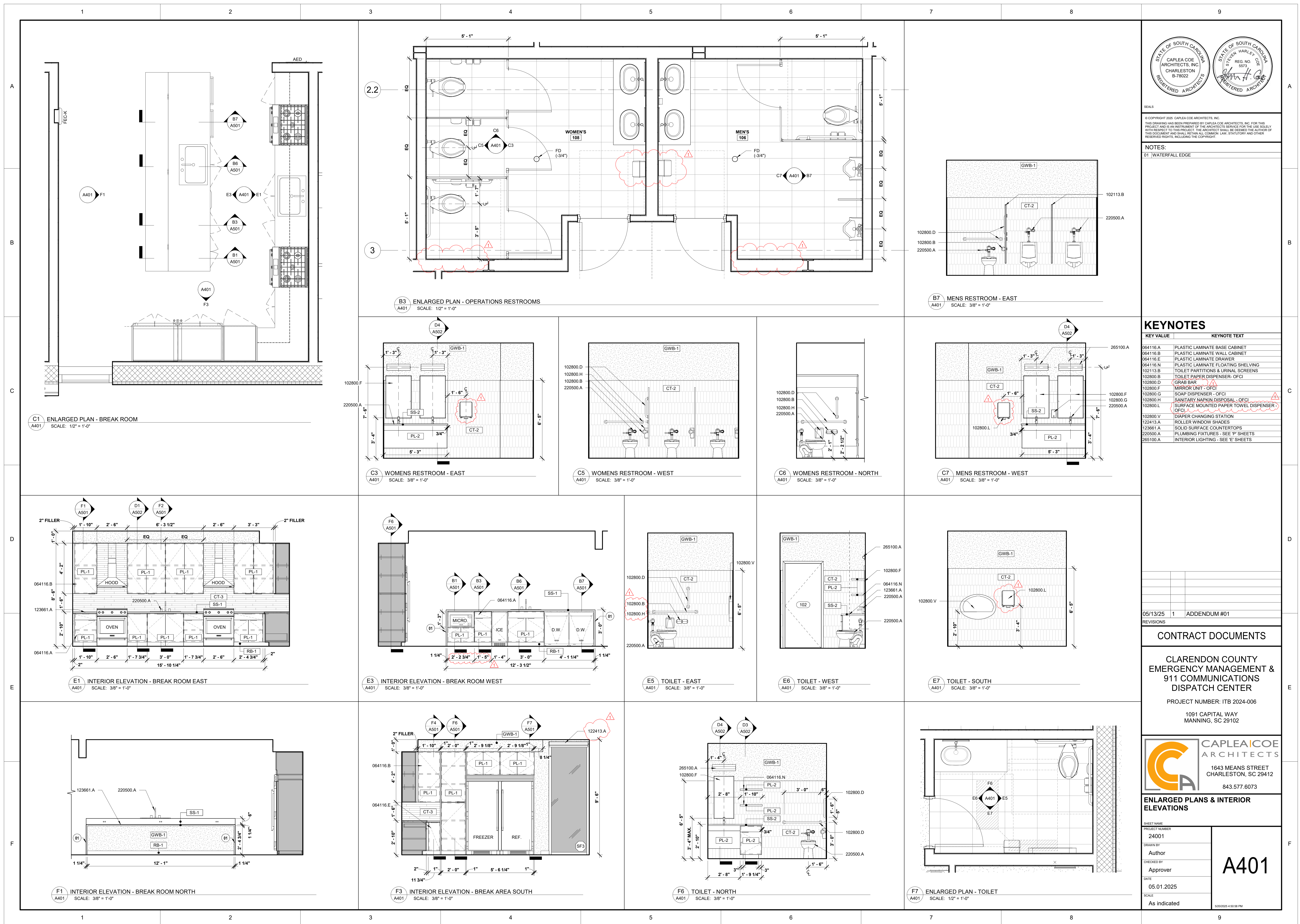


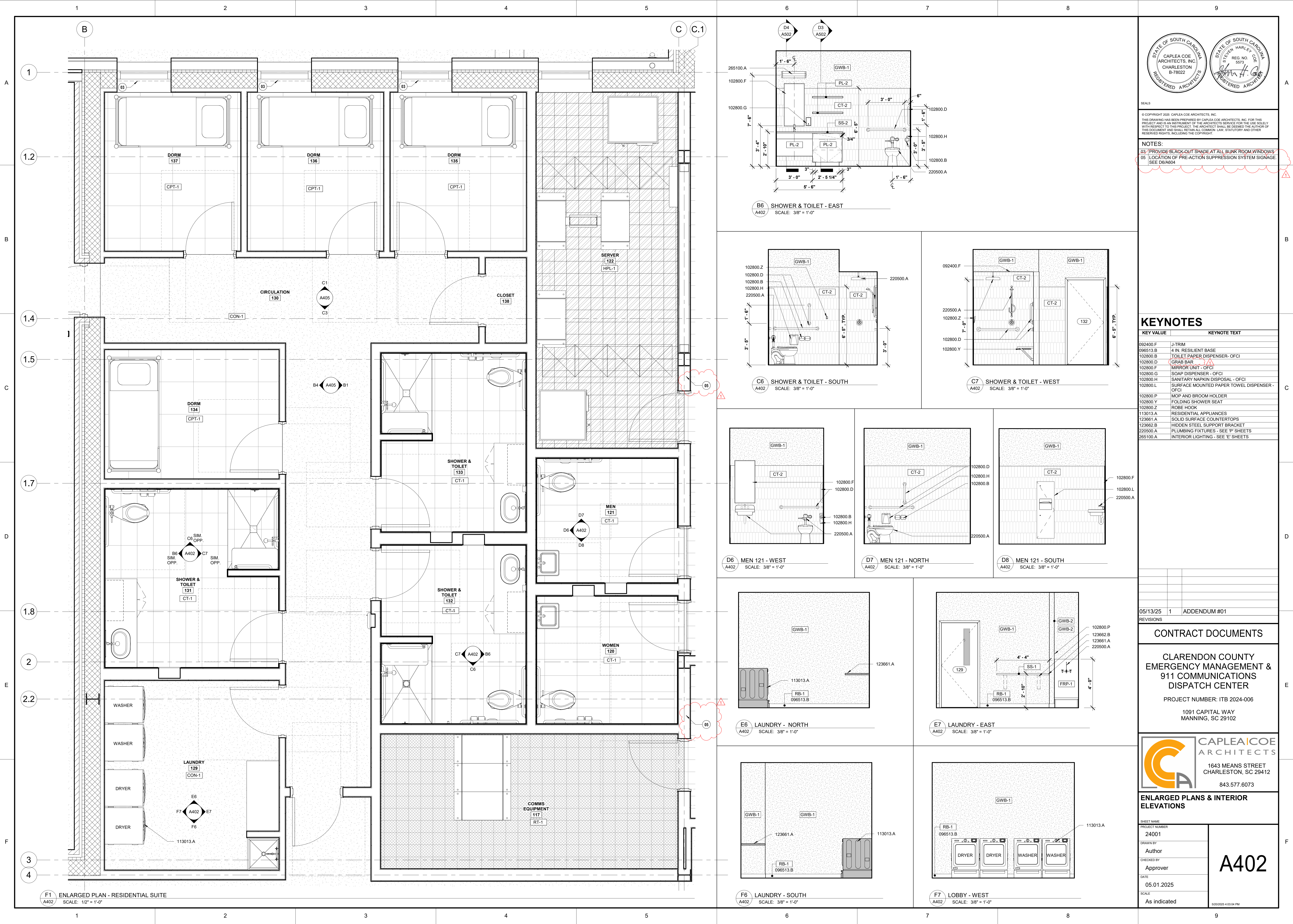
FIRST FLOOR REFLECTED CEILING
PLAN

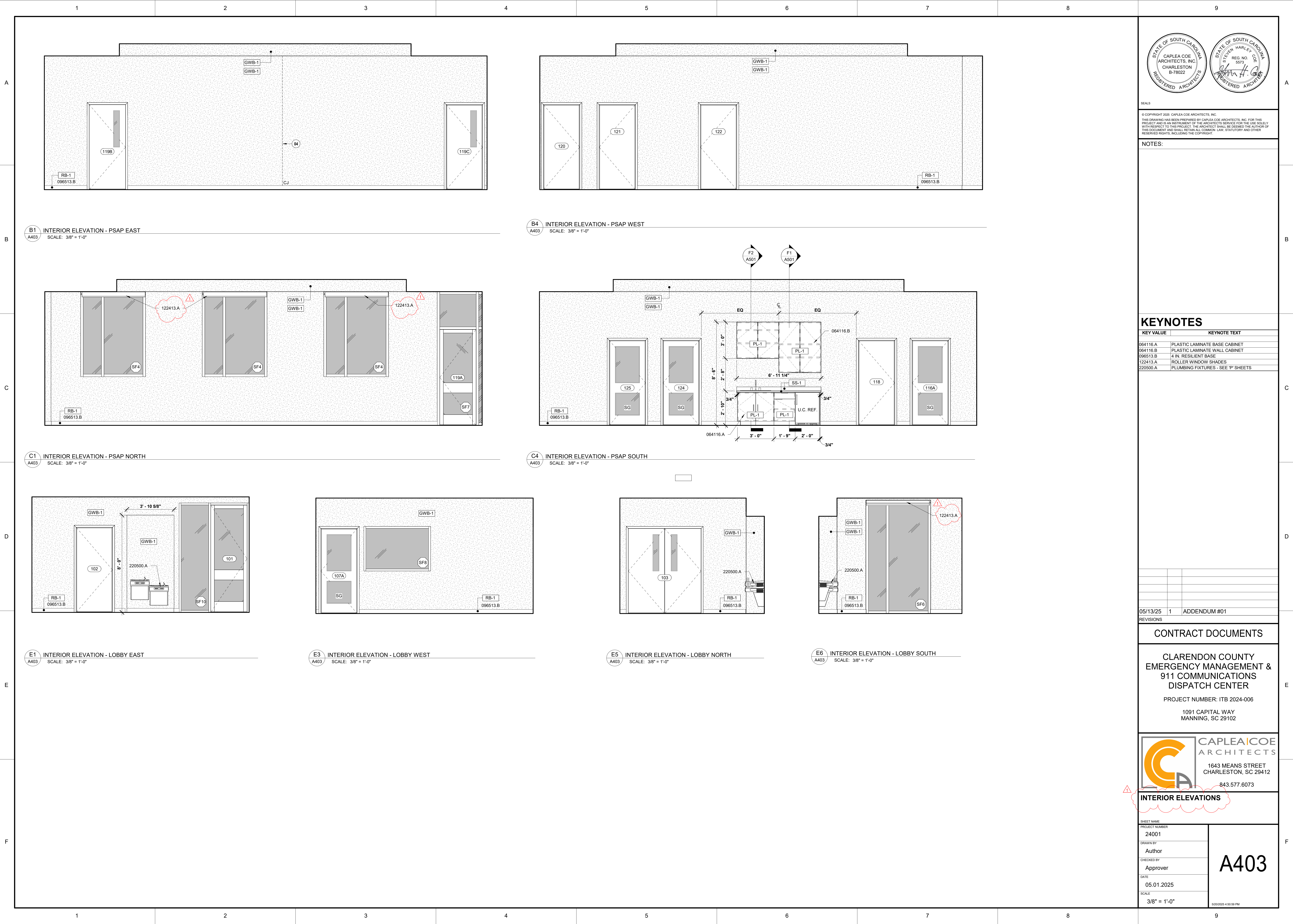
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CHECKED BY	Author
DATE	Approver
SCALE	05.01.2025
As indicated	6/20/2025 4:02:31 PM

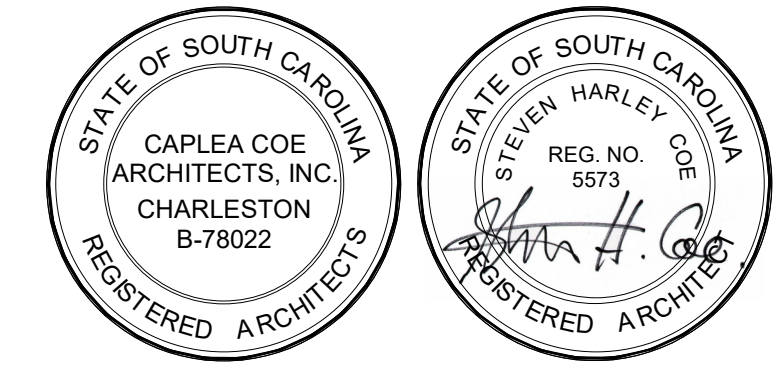
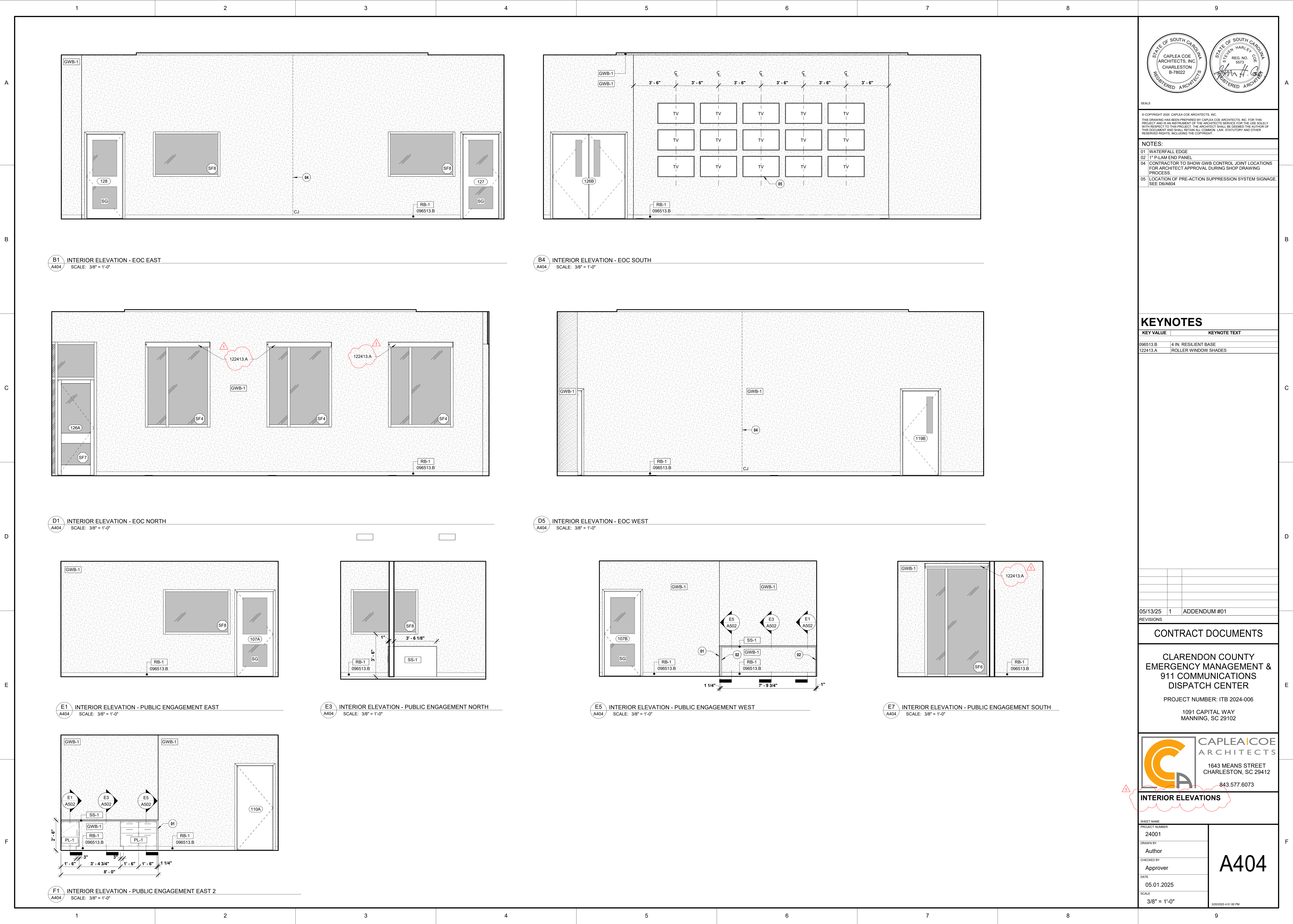
A120











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- NOTES:
- 01 WATERFALL EDGE
 - 02 1" P-LAM END PANEL
 - 04 CONTRACTOR TO SHOW GWB CONTROL JOINT LOCATIONS FOR ARCHITECT APPROVAL DURING SHOP DRAWING PROCESS.
 - 05 LOCATION OF PRE-ACTION SUPPRESSION SYSTEM SIGNAGE SEE D6/A604

KEYNOTES

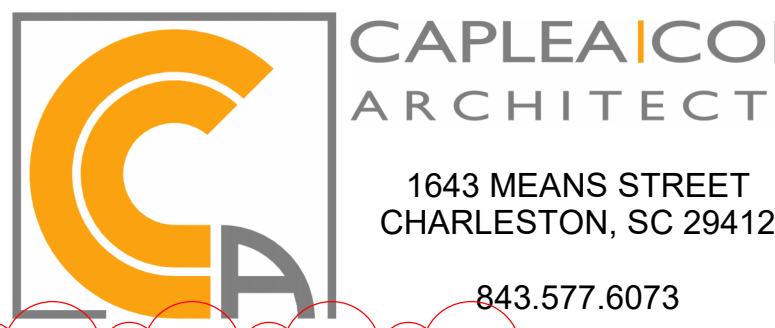
KEY VALUE	KEYNOTE TEXT
096513.B	4 IN. RESILIENT BASE
122413.A	ROLLER WINDOW SHADES

05/13/25	1	ADDENDUM #01
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CONTRACT DOCUMENTS

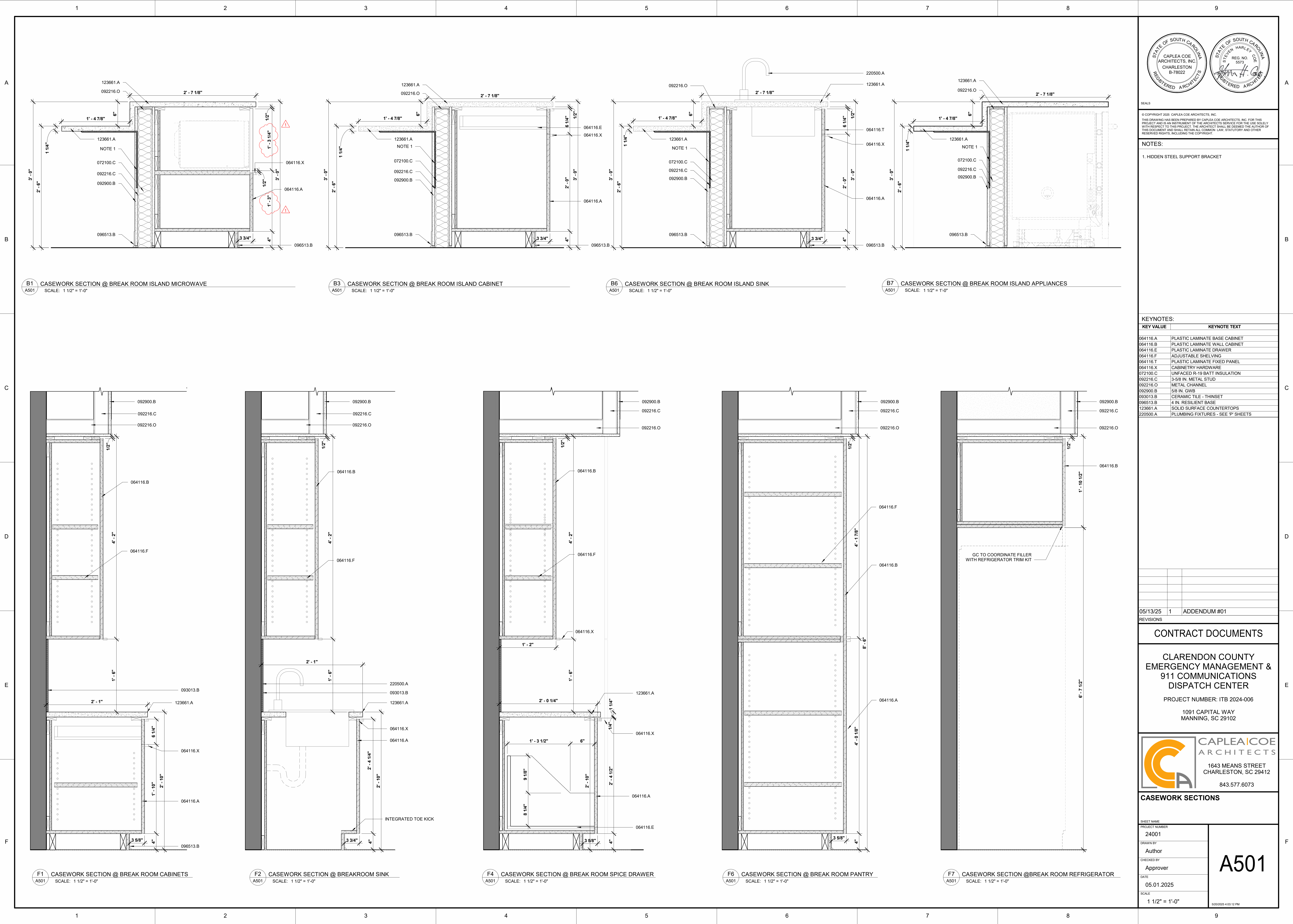
CLARENDON COUNTY
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MANNING, SC 29102



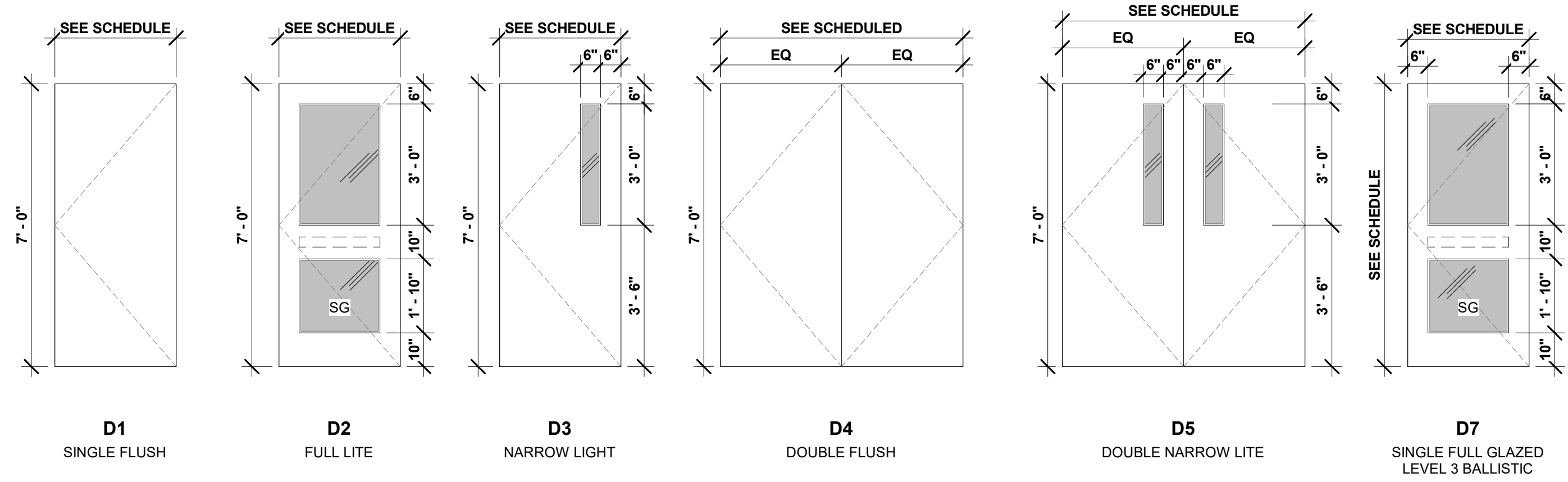
INTERIOR ELEVATIONS

SHEET NAME	A404
PROJECT NUMBER	
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DATE	
SCALE	

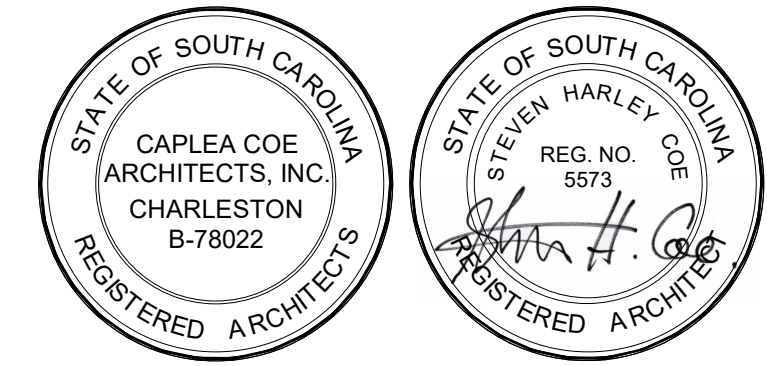
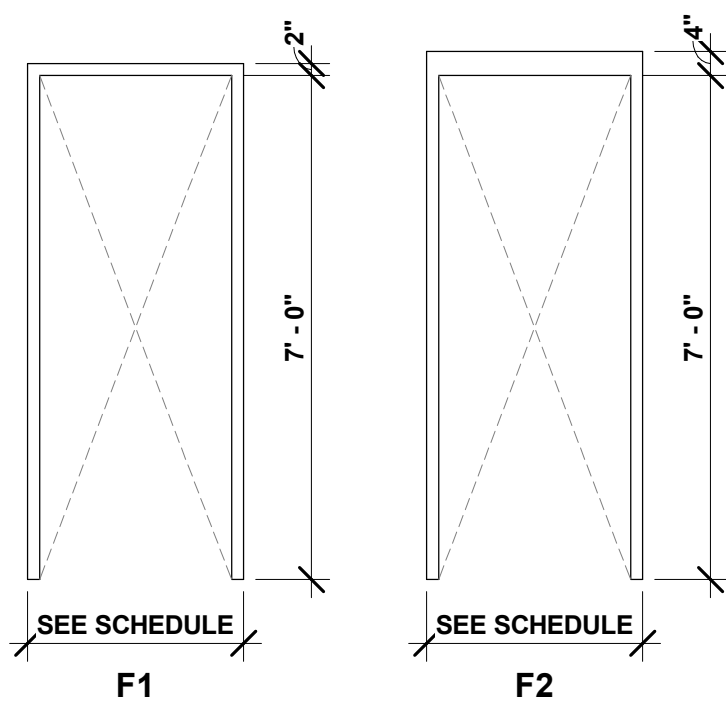


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DOOR LEGEND



FRAME LEGEND



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NOTES:

05/13/25	1	ADDENDUM #01
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CONTRACT DOCUMENTS

CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

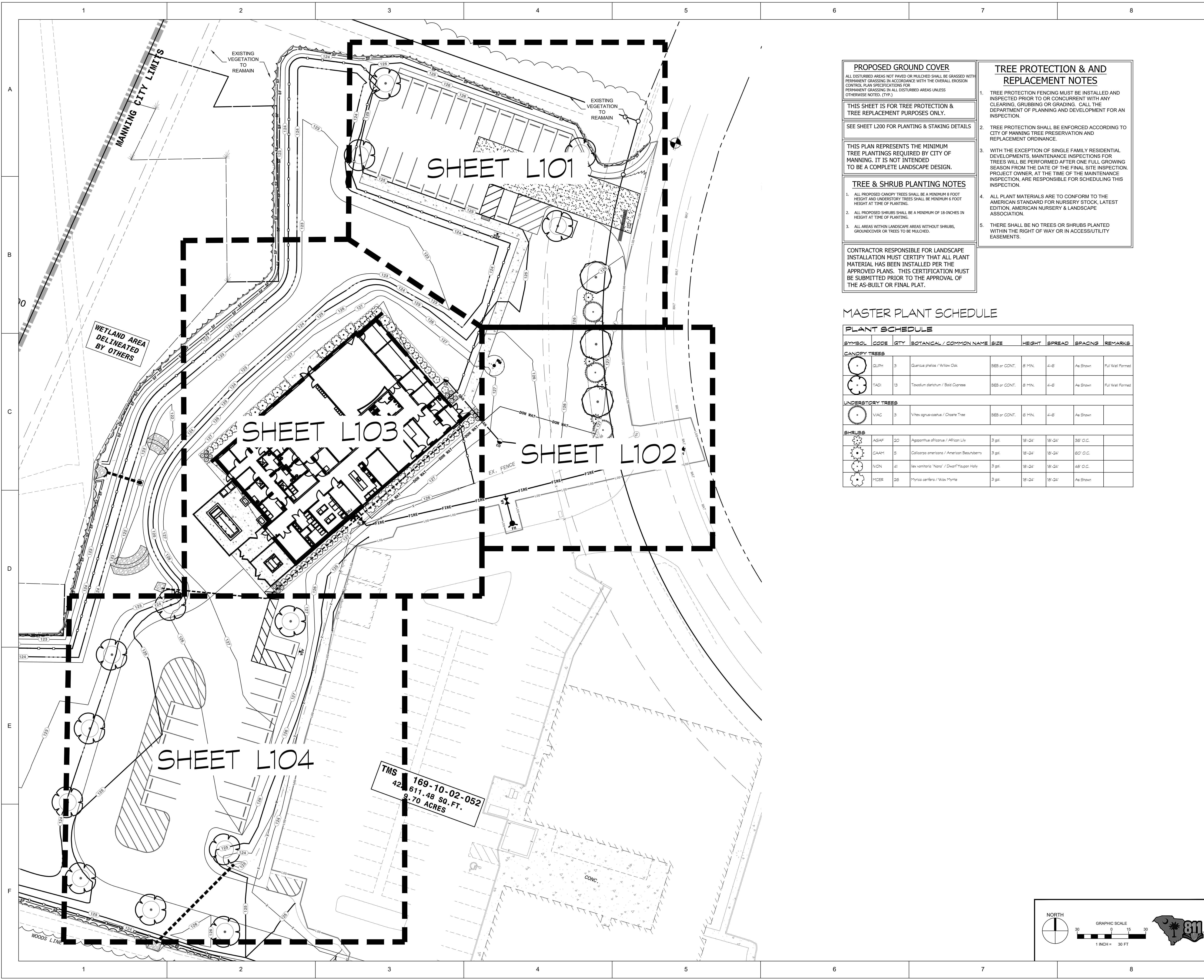
PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102



CAPLEA COE
ARCHITECTS

1643 MEANS STREET
CHARLESTON, SC



PROPOSED GROUND COVER

ALL DISTURBED AREAS NOT PAVED OR MULCHED SHALL BE GRASSED WITH PERMANENT GRASSING IN ACCORDANCE WITH THE OVERALL EROSION CONTROL PLAN SPECIFICATIONS FOR PERMANENT GRASSING IN ALL DISTURBED AREAS UNLESS OTHERWISE NOTED. (TYP.)

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SEE SHEET L200 FOR PLANTING & STAKING DETAILS

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MASTER PLANT SCHEDULE

PLANT SCHEDULE									
SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME	SIZE	HEIGHT	SPREAD	SPACING	REMARKS	
CANOPY TREES									
	QUPH	3	Quercus phellos / Willow Oak	BEB or CONT.	8 MIN.	4-6'	As Shown	Full Well Formed	
	TADI	13	Taxodium distichum / Bald Cypress	BEB or CONT.	8 MIN.	4-6'	As Shown	Full Well Formed	
UNDERSTORY TREES									
	VIAC	3	Vitex agnus-castus / Chaste Tree	BEB or CONT.	6 MIN.	4-6'	As Shown		
SHRUBS									
	ASAF	20	Asparagus africanus / African Lily	3 gal.	18'-24"	18'-24"	36" O.C.		
	CAAM	5	Calliopsis americana / American Beautyberry	3 gal.	18'-24"	18'-24"	60" O.C.		
	NCON	41	Ilex vomitoria 'Nana' / Dwarf Yaupon Holly	3 gal.	18'-24"	18'-24"	48" O.C.		
	MYCB	26	Myrica cerifera / Wax Myrtle	3 gal.	18'-24"	18'-24"	As Shown		

SEALS

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NOTES:

REVISIONS

CONTRACT DOCUMENTS

**CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER**

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102

**CAPLEA COE
ARCHITECTS**

1643 MEANS STREET
CHARLESTON, SC 29412

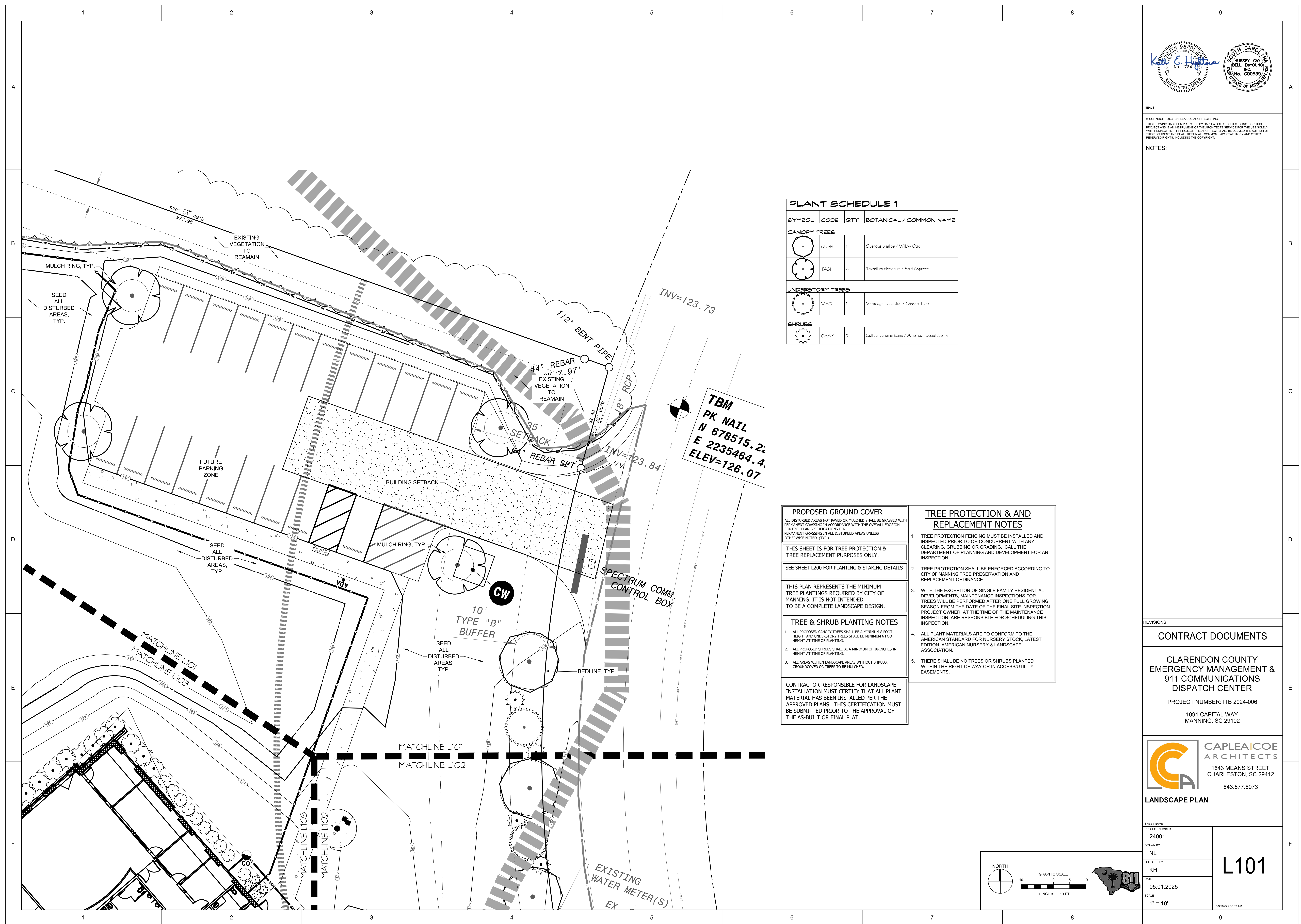
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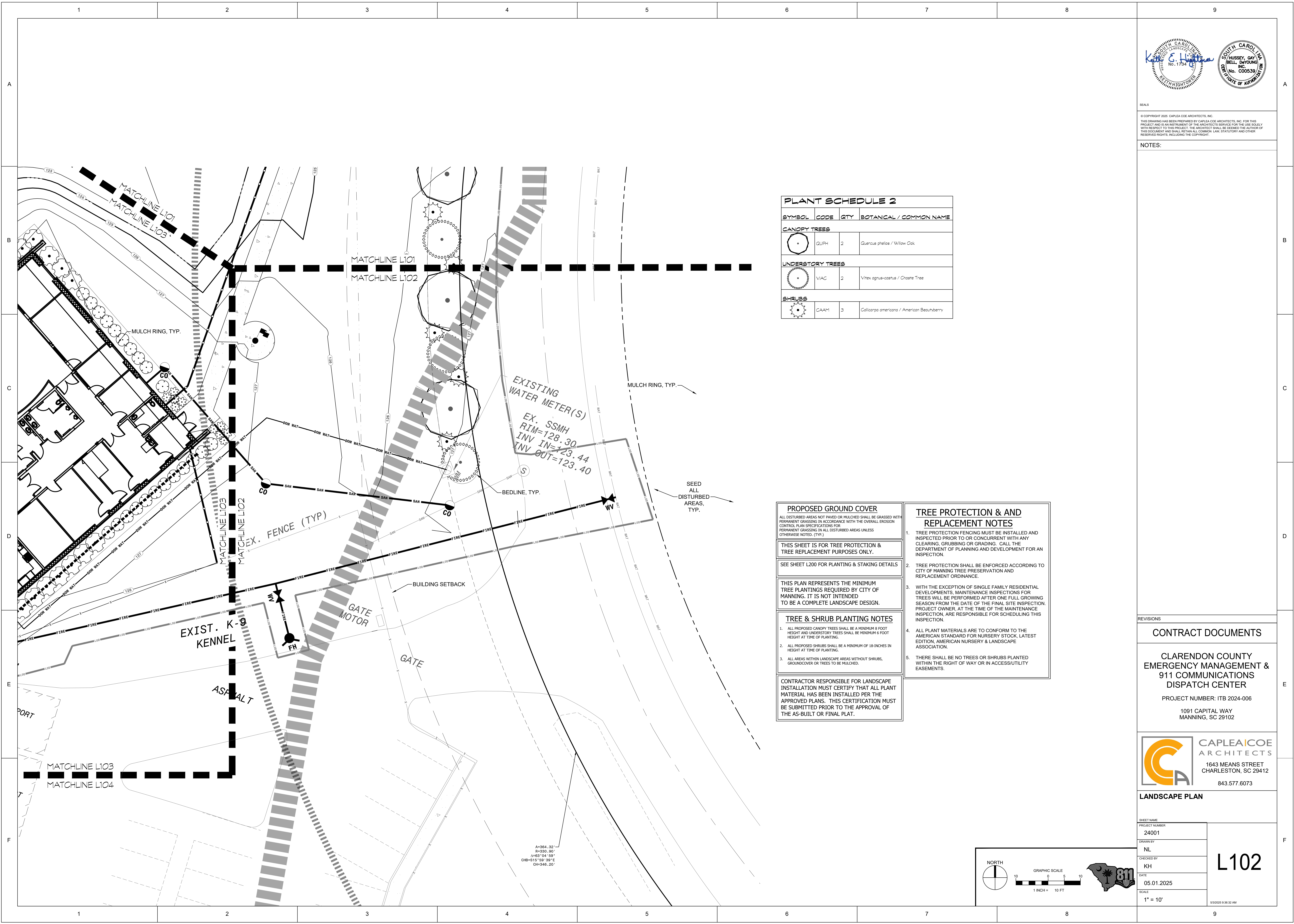
LANDSCAPE SHEET KEY

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PROJECT NUMBER	
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1" = 30'

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SEALS

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NOTES:

PLANT SCHEDULE 2			
SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
CANOPY TREES			
	QLPH	2	Quercus phellos / Willow Oak
UNDERSTORY TREES			
	VIAC	2	Vitex agnus-castus / Chaste Tree
SHRUBS			
	CAAM	3	Callicarpa americana / American Beautyberry

PROPOSED GROUND COVER

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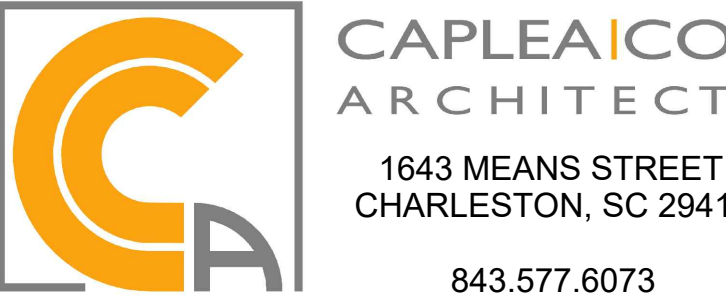
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CONTRACT DOCUMENTS

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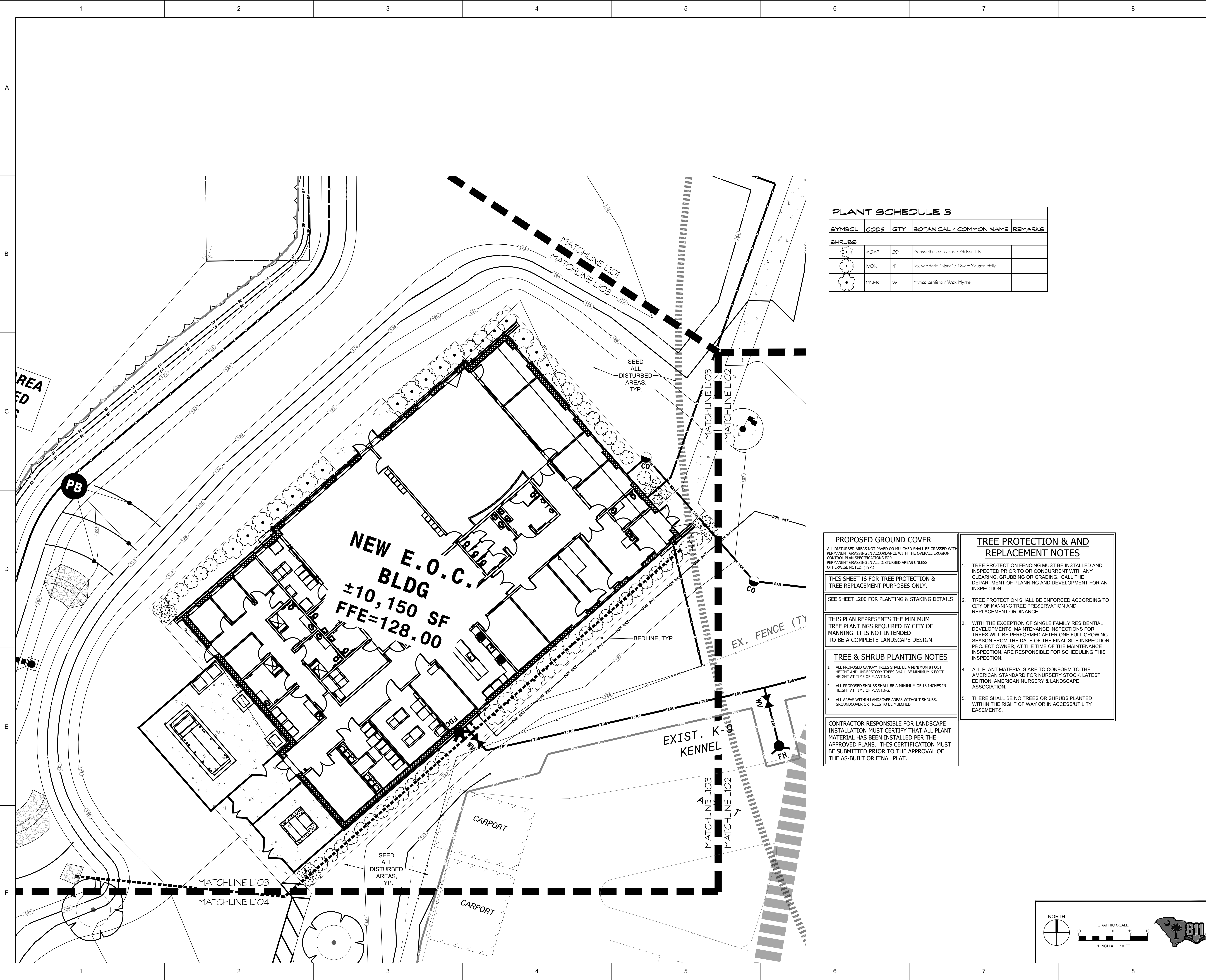
PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29412



LANDSCAPE PLAN

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PROJECT NUMBER	
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NL	
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PLANT SCHEDULE 3				
SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME	REMARKS
SHRUBS				
	AGAF	20	Agapanthus africanus / African Lily	
	IVON	41	Ilex vomitoria 'Nana' / Dwarf Yaupon Holly	
	MGER	26	Myrica cerifera / Wax Myrtle	

PROPOSED GROUND COVER
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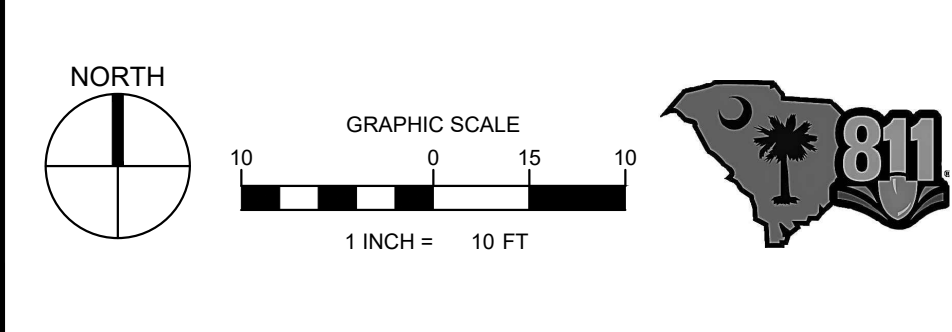
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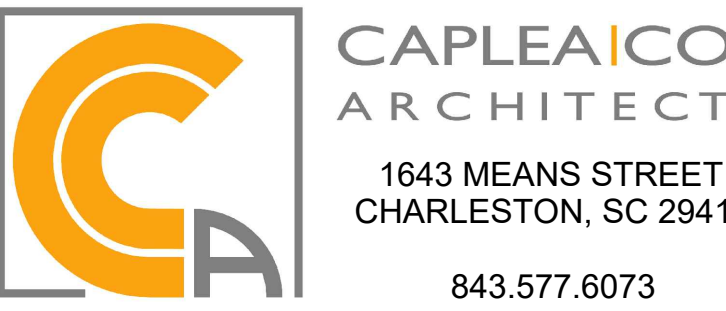
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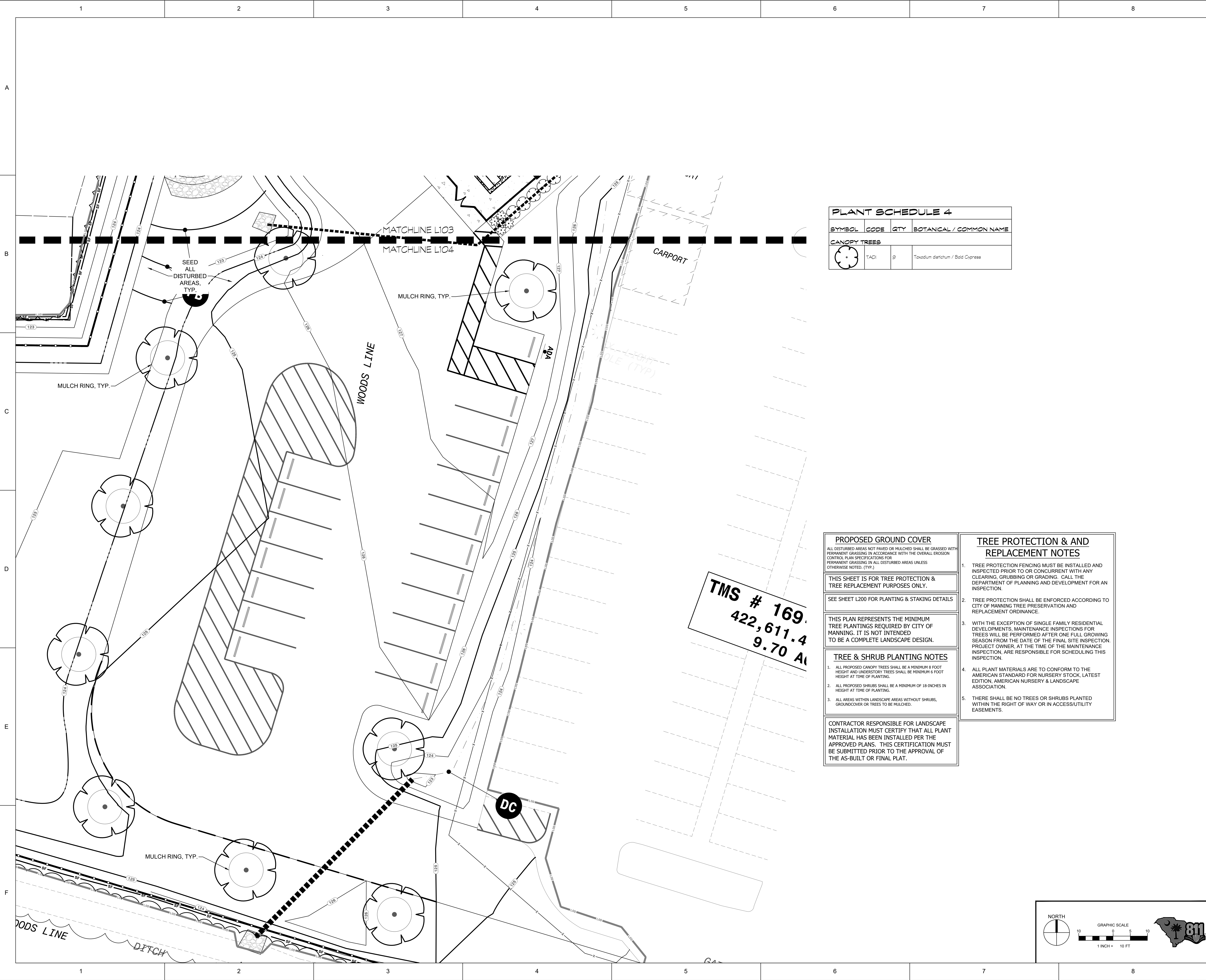
PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102



LANDSCAPE PLAN

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PROJECT NUMBER	
24001	
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NL	
CHECKED BY	KH
DATE	
05.01.2025	
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PLANT SCHEDULE 4			
SYMBOL	CODE	QTY	BOTANICAL / COMMON NAME
CANOPY TREES			
	TAD1	9	Taxodium distichum / Bald Cypress

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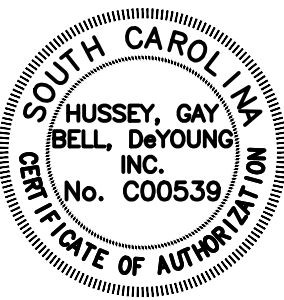
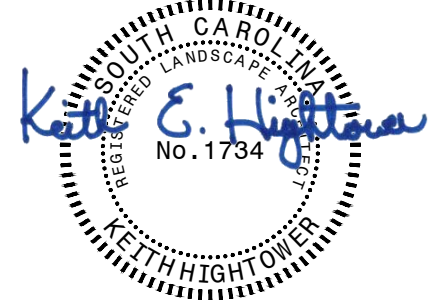
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- TREE PROTECTION SHALL BE ENFORCED ACCORDING TO CITY OF MANNING TREE PRESERVATION AND REPLACEMENT ORDINANCE.
- WITH THE EXCEPTION OF SINGLE FAMILY RESIDENTIAL DEVELOPMENTS, MAINTENANCE INSPECTIONS FOR TREES WILL BE PERFORMED AFTER ONE FULL GROWING SEASON FROM THE DATE OF THE FINAL SITE INSPECTION. PROJECT OWNER, AT THE TIME OF THE MAINTENANCE INSPECTION, ARE RESPONSIBLE FOR SCHEDULING THIS INSPECTION.
- ALL PLANT MATERIALS ARE TO CONFORM TO THE AMERICAN STANDARD FOR NURSERY STOCK, LATEST EDITION, AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
- THERE SHALL BE NO TREES OR SHRUBS PLANTED WITHIN THE RIGHT OF WAY OR IN ACCESS/UTILITY EASEMENTS.



SEALS

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CONTRACT DOCUMENTS

**CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER**

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29412



**CAPLEA COE
ARCHITECTS**

1643 MEANS STREET
CHARLESTON, SC 29412

843.577.6073

LANDSCAPE PLAN

SHEET NAME

PROJECT NUMBER

24001

DRAWN BY

NL

CHECKED BY

KH

DATE

05.01.2025

SCALE

1" = 10'

L104

5/3/2025 9:36:32 AM

Xref X:\Shared\COL\Drawings\ PROJ-COLA\COMMERCIAL\CAD\EA COE324131023 - New Emergency Management & 911 Communications Dispatch Center\ CAD\ Xrefs\Titleblocks\E911 24X36 landscape.dwg



1



1. INSTALLATION WITHOUT FOOD WASTE GRINDER SIMILAR

NOT TO SCALE

* ACTUAL CAPACITY SHALL BE WITHIN 5% OF NOMINAL CAPACITY FOR CAPACITIES LARGER THAN 80 GALLONS.

- (1) FLOOR MOUNT (4) HOUSEKEEPING PAD
(2) REFER TO DETAIL ON THIS SHEET
(3) ASME

* ONE TANK REQUIRED WHERE MULTIPLE HEATERS ARE PIPED TOGETHER UNLESS INDICATED OTHERWISE.

- ① HORIZONTAL
② VERTICAL
③ REFER TO DETAIL ON THIS SHEET

① WALL MOUNT ② ALL VALVES SHALL BE LEAD FREE ③ REFER TO DETAIL ON THIS SHEET



- 1 VALVE STEMS ON VALVES AND THERMOMETERS SHALL HAVE EXTENSIONS MIN. 1/2" GREATER THAN THICKNESS OF INSULATION.
- 2 PIPING SHALL BE FIELD INSULATED IN ACCORDANCE WITH SPECIFICATION SECTION 22 0719.

- NOTES:

- ① FULL PORT BALL VALVE
- ② THERMOMETER.
- ③ LAWLOR MIXING VALVE 802. SEE SCHEDULE, THIS SHEET.
- ④ CHECK VALVE.
- ⑤ RECIRCULATION PUMP. BELL AND GOSSETT MODEL PL-36
ALL BRONZE CONSTRUCTION.
- ⑥ CIRCUIT SETTING BALANCING VALVE.
- ⑦ STOP AND CHECK VALVE.
- ⑧ EPOXY-COATED STRUT.
- ⑨ STRAP ON AQUASTAT.

NOT TO SCALE



1. SEE SPECIFIC EQUIPMENT DETAILS FOR ADDITIONAL INFORMATION (DIMENSIONS, ETC.)
2. PAN SHALL EXTEND 4" FURTHER THAN EQUIPMENT CAN OVERFLOW EACH DIRECTION.
3. PAN SHALL HAVE CONNECTION FOR AUXILIARY DRAIN LINE IF SPECIFIED OR INDICATED. CONNECTION SHALL BE AT BOTTOM OF SIDE OF PAN OR BOTTOM OF PAN.

NOT TO SCALE



- ① ASME RATED T & P RELIEF VALVE, PIPE FULL SIZE TO FLOOR DRAIN.
- ② THERMOSTATIC MIXING VALVE INCORPORATED INTO A PRE-PIPED MANIFOLD SYSTEM. SEE DETAIL THIS SHEET, FOR MORE INFORMATION.
- ③ EXPANSION TANK, SEE EXPANSION TANK SCHEDULE, THIS SHEET. SECURE FROM STRUCTURE ABOVE.
- ④ PROVIDE HEAT TRAP OF SIZE AND LOCATION AS RECOMMENDED BY MIXING VALVE MANUFACTURER.
- ⑤ BYPASS TO BE ONE SIZE SMALLER THAN H.W. AND C.W. SIZE.
- ⑥ AUXILIARY DRAIN PAN. REFER TO DETAIL, THIS SHEET.
- ⑦ HOUSEKEEPING PAD. REFER TO DETAIL, THIS SHEET.
- ⑧ THERMOSTATIC BALANCING VALVE. PROVIDE CIRCUIT SOLVER MODEL CSUTD-3/4-100-CV-1-TW, UNION, STRAINER ASSEMBLY (CSUTD) WITH THERMOMETER.

NOT TO SCALE



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1331 Elmwood Avenue, Suite 200
Columbia, SC 29201 803-254-6302

5/20/2025	1	Addendum #01
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CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102



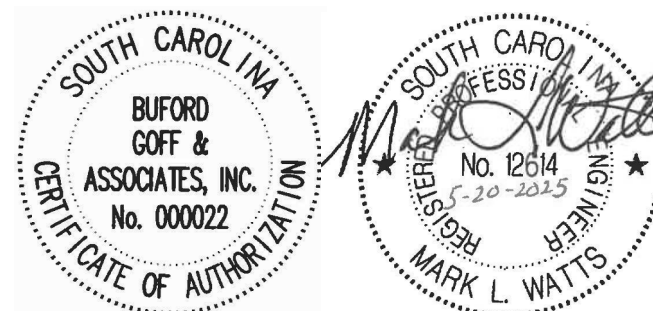
1643 MEANS STREET
CHARLESTON, SC 29412

843.577.6073

PLUMBING SCHEDULES & DETAILS

SHEET NAME	P002 5/20/2005 10:16:38 AM
PROJECT NUMBER	
24001	
DRAWN BY	
SJM	
CHECKED BY	
MA	
DATE	
05.01.2025	
SCALE	
As indicated	

5/20/2025 10:16:28 AM



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NOTES:

**Buford
Goff**
& Associates, Inc.
Engineers & Planners

1331 Elmwood Avenue, Suite 200
Columbia, SC 29201 803-254-6302

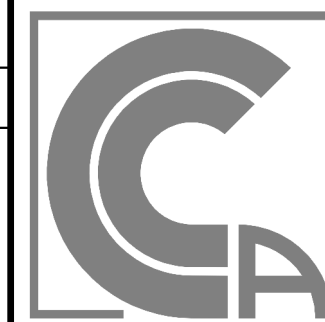
5/20/2025 1 Addendum #01
REVISIONS

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CLARENDON COUNTY
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911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102



CAPLE & COE
ARCHITECTS

1643 MEANS STREET
CHARLESTON, SC 29412

843.577.6073

FLOOR PLAN - PLUMBING - SUPPLY

SHEET NAME

PROJECT NUMBER

24001

DRAWN BY

SJM

CHECKED BY

MA

DATE

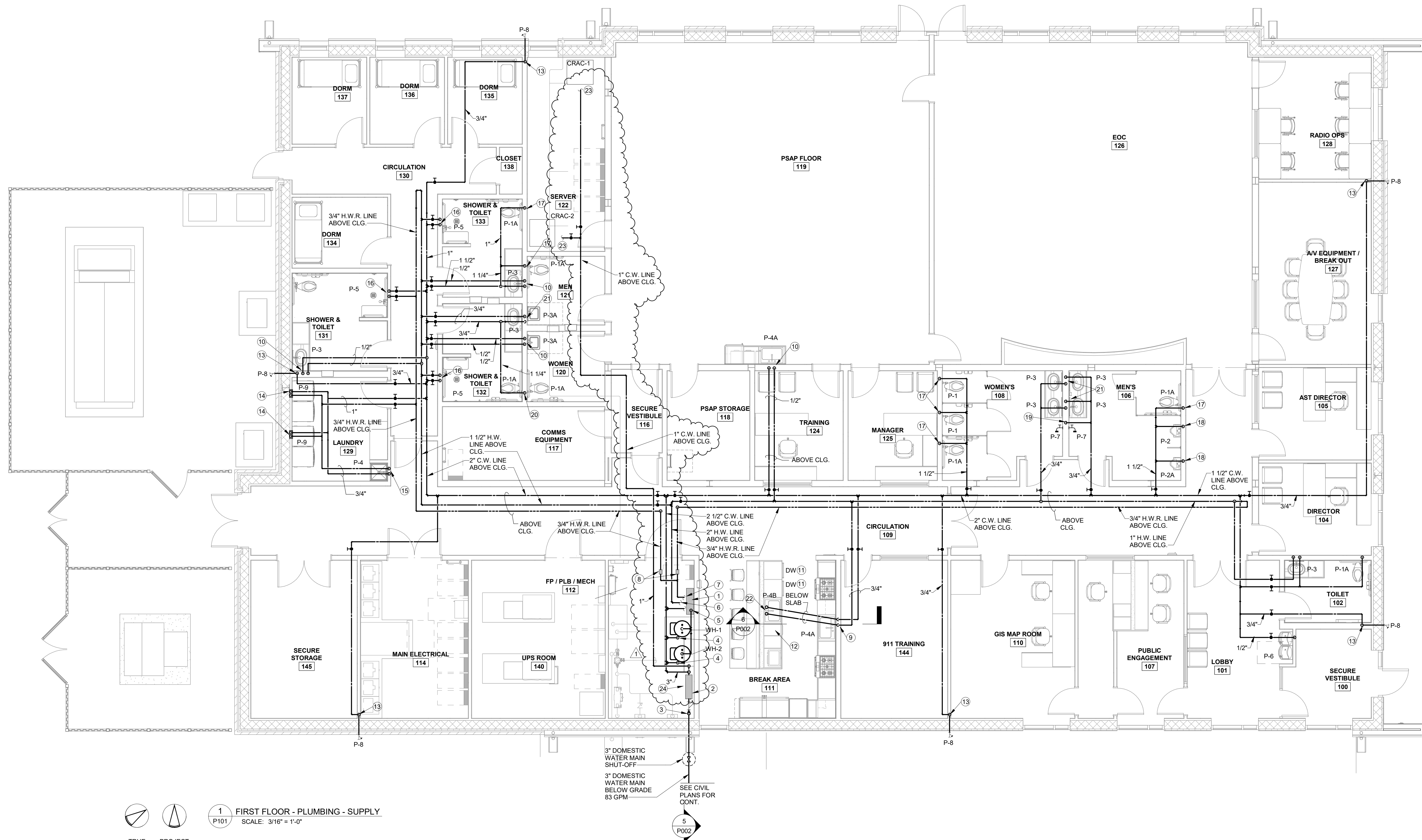
05.01.2025

SCALE

As indicated

5/20/2025 9:32:00 AM

P101

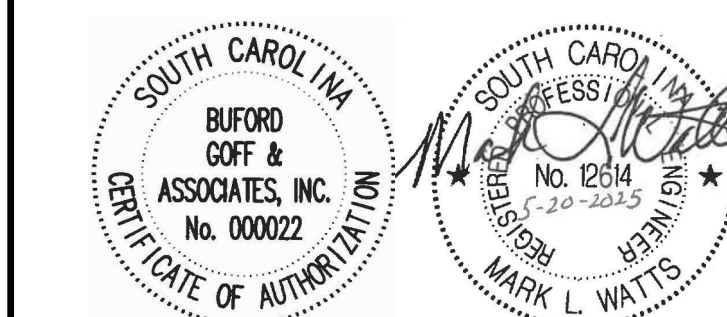


GENERAL NOTES:

- COLD AND HOT WATER LINES SHOWN IN THE AREA OF FIXTURE AND/OR TOILET GROUP SHALL RUN FULL SIZE OF HEADER INDICATED IN WALL AND/OR CHASE. PROVIDE CONNECTION TO FIXTURES AS CONNECTION SCHEDULE AND DETAILS INDICATE.
- ALL VALVE SHALL BE LOCATED A MAX. 24" ABOVE CEILING UNLESS APPROVED BY OWNER.
- ALL VALVES, AND SHOCK ABSORBERS ARE TO BE INSTALLED SO THEY ARE EASILY ACCESSIBLE.
- ALL SHUT-OFF VALVES SHALL BE BALL VALVES.
- PROVIDE AS ASSE 1070 MIXING VALVE @ ALL P-3 & P-3A FIXTURES.

NOTES:

- MIXING VALVE/REC. PUMP MANIFOLD ASSEMBLY. REFER TO DETAIL ON SHEET P002.
- DOUBLE CHECK VALVE BACKFLOW PREVENTER, APOLLO DCLF MODEL 4ALF 110 02. REFER TO DETAIL ON SHEET P002.
- 3" DOMESTIC WATER LINE UP.
- 1/2" C.W. LINE TO WATER HEATER. REFER TO WATER HEATER PIPING DETAIL ON SHEET P002.
- 2" H.W. LINE TO MIXING VALVE/REC. PUMP MANIFOLD. REFER TO DETAIL ON SHEET P002.
- 3/4" H.W.R. LINE FROM MIXING VALVE/REC. PUMP MANIFOLD. REFER TO DETAIL ON SHEET P002.
- 3/4" H.W.R. LINE TO MIXING VALVE/REC. PUMP MANIFOLD. REFER TO DETAIL ON SHEET P002.
- THERMOSTATIC BALANCING VALVE. PROVIDE CIRCUIT SOLVER MODEL CSUAS-3/4"-100-CV1-TW.
- 3/4" C.W. & 3/4" H.W. (110") LINE DN. TO (2)P-4A.
- 1/2" C.W. & 1/2" H.W. (110") DN.
- DISHWASHER. RUN 1/2" H.W. LINE FROM SINK H.W. SUPPLY WITH BALL VALVE SHUT-OFF TO EACH DISHWASHER.
- UNDER COUNTER ICE MAKER. RUN 1/2" C.W. LINE FROM SINK C.W. SUPPLY WITH BALL VALVE SHUT-OFF TO ICE MAKER.
- 3/4" C.W. LINE DN.
- 1/2" C.W. & 1/2" H.W. LINES DN. TO WASHING MACHINE VALVE BOX.
- 1/2" C.W. & 1/2" H.W. LINES DN. TO P-4.
- 1/2" C.W. & 1/2" H.W. LINES DN. TO SHOWER CONTROL VALVE.
- 1" C.W. LINE DN.
- 3/4" C.W. LINE DN.
- 1/2" C.W. LINE DN.
- 1 1/4" C.W. LINE DN.
- 3/4" C.W. & 3/4" H.W. LINES DN.
- 1/2" C.W. & 1/2" H.W. LINES UP.
- 3/4" C.W. LINE TO HVAC UNIT HUMIDIFIER.
- REDUCED PRESSURE BACKFLOW PREVENTER, APOLLO SERIES RPLF4A, MODEL 4ALF-215-ALL. LOCATED BENEATH DOUBLE CHECK VALVE. REFER TO DETAIL ON SHEET P002.



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& Associates, Inc.
Engineers & Planners
1331 Elmwood Avenue, Suite 200
Columbia, SC 29201 803-254-6302

5/20/2025	1	Addendum #01
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CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102

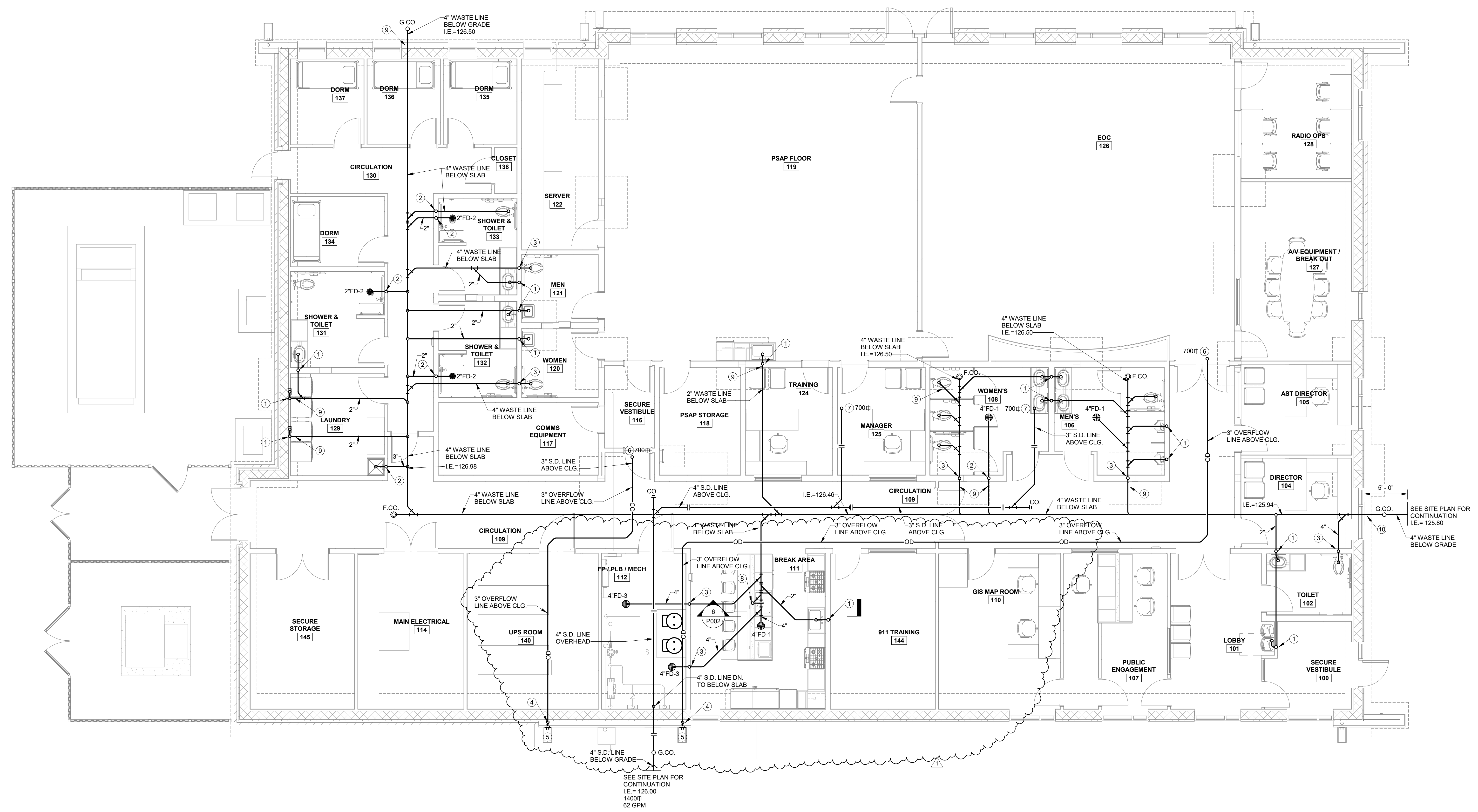
CAPLEA COE ARCHITECTS
1643 MEANS STREET
CHARLESTON, SC 29412
843.577.6073

FLOOR PLAN - PLUMBING -
WASTE/VENT

SHEET NUMBER	24001
DRAWN BY	SJM
CHECKED BY	MA
DATE	05.01.2025
SCALE	As indicated

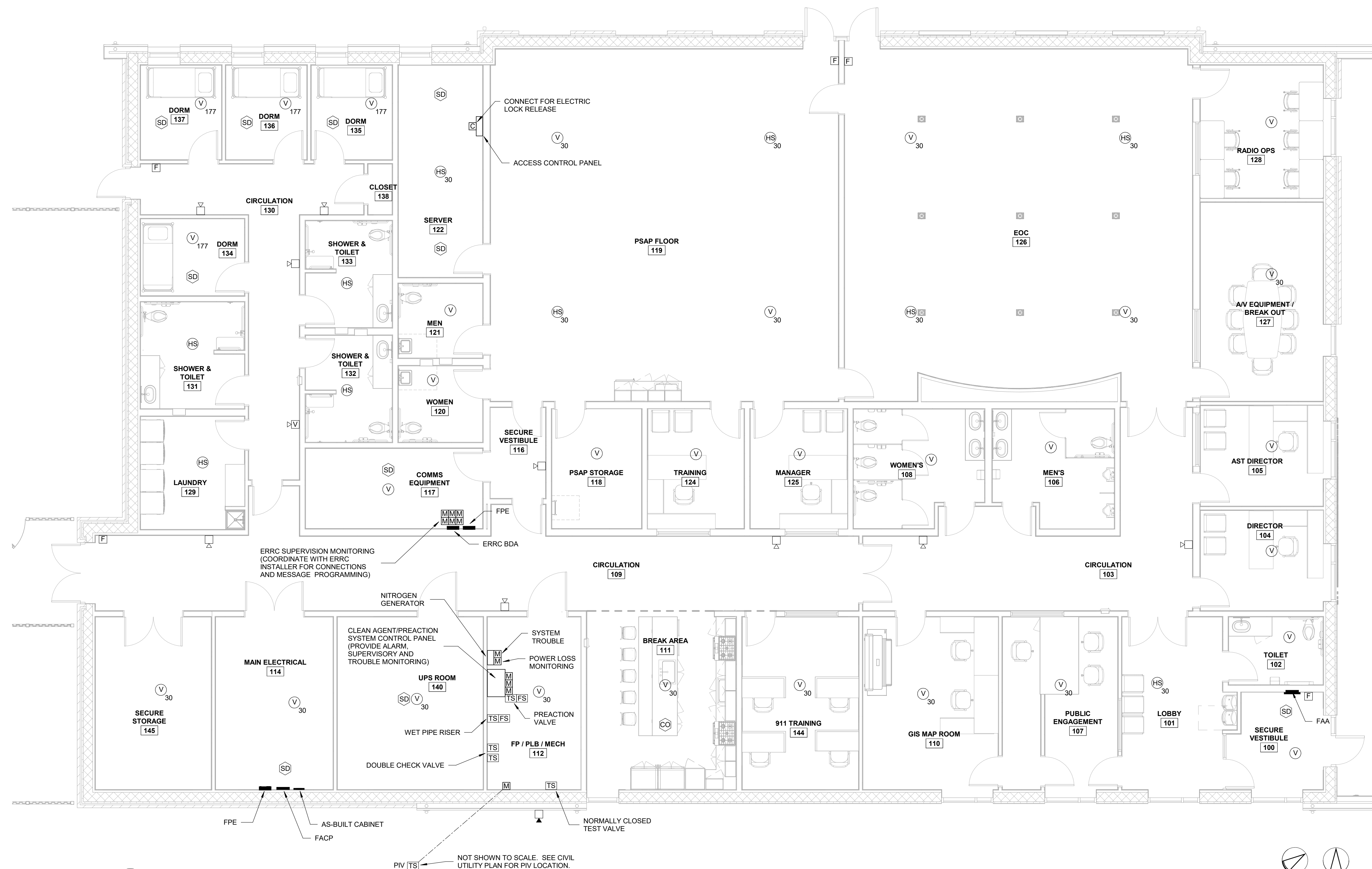
5/20/2025 9:32:03 AM

P102



1 FIRST FLOOR - PLUMBING - WASTE/VENT (F.F. = 128.00)
SCALE: 3/16\"/>

- GENERAL NOTES:**
- 1) PROVIDE TRAP SEAL PROTECTION DEVICE IN ALL FLOOR DRAINS.
 - 2) FOR P# REFER TO SHEET P101.
 - 3) FOR VENT PIPING REFER TO SHEET P200.
 - 4) ALL 2\"/>
- NOTES:**
- 1) 2\"/>
 - 2) 2\"/>
 - 3) 3\"/>
 - 4) 3\"/>
 - 5) RUN 3\"/>
 - 6) 3\"/>
 - 7) 3\"/>
 - 8) 3\"/>
 - 9) PIPE ROUTE ABOVE FOOTING.
 - 10) DROP FOOTING TO ALLOW FOR PIPE INSTALLATION.



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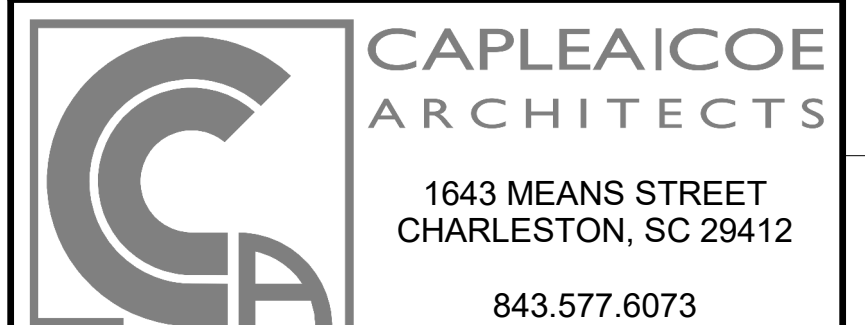
5/20/2025	1	ADDENDUM #01
REVISIONS		

CONTRACT DOCUMENTS

CLARENDON COUNTY
EMERGENCY MANAGEMENT &
911 COMMUNICATIONS
DISPATCH CENTER

PROJECT NUMBER: ITB 2024-006

1091 CAPITAL WAY
MANNING, SC 29102



FIRST FLOOR PLAN - FIRE ALARM

SHEET NAME

PROJECT NUMBER
24001

GMC

CHECKED BY
ECW

DATE
05.01.2025

SCALE

As indicated

E301

6/20/2025 3:00:19 PM

Thermal Resource Sales, Inc. 7499 Parklane Rd Suite 100 Columbia, SC 29223		PH: 803-419-6401 Fax: 803-419-6402 www.trs-hvac.com bill.brook@coolsys.com
PRIOR APPROVAL REQUEST		

May 7, 2025

Buford and Goff Associates
1331 Elmwood Avenue, Suite 200
Columbia, SC 29201

RE: Clarendon County Emergency Management & 911 Communications Dispatch Center

Mr. Jonathan Burkett:

For your consideration, we are requesting prior approval to bid the following mechanical equipment for use on this project. We have many references and installations throughout the construction markets in the Southeast, including the Carolinas.

We are requesting permission to bid these specific manufacturers according to the plans and specifications.

<u>Product</u>	<u>Manufacturer</u>	<u>Spec. Section</u>
Gravity Ventilators	Twin City Fan	23 37 23
Ductless Split Systems	Samsung	23 90 05
VRF Systems	Samsung	23 9005.2
Electric Heaters	INDEECO	23 90 06

These companies' lines of equipment have been in manufacturing for many years and are nationally recognized. If you require additional information on these companies or performance data on their products, we would be happy to provide you with that data.

Thank you for your consideration. We look forward to the opportunity to prepare a bid on this project and await your response.

Regards,

Bill Brook

Bill Brook
Branch Manager

THE LISTED MANUFACTURERS ABOVE WILL BE CONSIDERED FOR SUBSTITUTION, PROVIDED ALL PERFORMANCE SPECIFICATIONS ARE MET & DOCUMENTATION TO THAT EFFECT IS PROVIDED DURING THE SUBMITTAL PROCESS.

CSI Form 1.5C

SUBSTITUTION REQUEST

(During the Bid Period)

Project: Clarendon County Emergency Operations Center Substitution Request Number: _____

 From: Ellen Walkama
 To: _____ Date: 05/08/2025

 A/E Project Number: _____
 Re: Roofing Sub request Contract For: _____

Specification Title: Modified Bitumen System Description: _____
 Section: 0754 00 Page: _____ Article/Paragraph: _____

Proposed Substitution: Modified Bitumen System – SikaShield HB79 + SikaShield E54
 Manufacturer: Sika Address: 100 Dan Road Canton MA 02021 Phone: 781-332-3259
 Trade Name: Modified Bitumen System – SikaShield HB79 + SikaShield E54 Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: Ellen Walkama

Signed by: _____

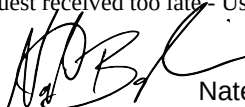
Firm: Sika

Address: 100 Dan Road Canton MA 02021

Telephone: 781-332-3259

A/E's REVIEW AND ACTION

- ☒ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by:  Nate Boykin, AIA - Project Manager Date: 05/21/2025

Supporting Data Attached: ☐ Drawings ☒ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

PRODUCT DATA SHEET

SikaShield® HB79 MGF 4 mm

160 mil hybrid (SBS/APAO) bituminous cap sheet, cold/mop-applied

PRODUCT DESCRIPTION

SikaShield® HB79 MGF 4 mm is a 2-in-1 modified bituminous roofing membrane with a thickness of 160 mil. The upper layer is APAO modified, which provides excellent heat resistance, while the under layer is SBS modified, which increases the elongation, elasticity, and cold flexibility properties. It is reinforced with a dimensionally stable composite inlay of a fiberglass mat compressed between two layers of non-woven spunbond polyester fabric and is flexible at -13°F (-25°C). The top surface is coated with mineral granules, which allows the permanent exposure to UV radiation.

USES

The Product is used as a roof membrane for:

- Flat or sloped roofs with up to 15 % gradient
- Balconies and terraces

CHARACTERISTICS / ADVANTAGES

- Combines the advantages of APAO and SBS bitumen
- High durability
- Thicker membrane
- Highly flexible at low temperatures
- High heat resistance
- High impact and shear resistance
- Excellent fatigue strength
- Can be installed by torch, mop, cold adhesion or mechanical fixation
- Fully bonded
- Can be coated immediately after application
- Tiles can be placed directly onto the membrane

APPROVALS / STANDARDS

- Meets or exceeds the ASTM D6163, Type I, Grade G
- Underwriters Laboratory (UL)
- FM Global
- CRRC
- SikaShield® Pure-Air is certified according to the Photocatalytic Performance ISO 22197-1, D-tox, Nr. 25062020

PRODUCT INFORMATION

Chemical Base	Top Layer	APAO modified bitumen	
	Bottom layer	SBS modified bitumen	
Reinforcing Material	Composite inlay of a fiberglass mat compressed between two layers of non-woven spunbond polyester fabric		
Packaging	Roll width	39.4" (1.0 m)	(ASTM D5147)
	Roll length	32.8 ft (10 m)	
Shelf Life	36 months from the date of production		
Storage Conditions	The Product must be stored in original unopened and undamaged packaging in dry conditions and temperatures between 41°F (5°C) and 95°F (35°C). Store in a vertical position. Do not stack pallets of the rolls on top of each other, or under pallets of any other materials during transport or storage. Always refer to packaging.		
Top surface	Mineral Granules: ▪ Regular white ▪ High Reflective White ▪ Pure-Air (Smog Reduction) ▪ Other colors: grey, green, black, red, blue		
Bottom Surface	Type	Application method	
	Polyethylene Foil (burn-off foil)	Torch	
	Non-woven polypropylene (fabric)	Cold and Mop	
Effective Thickness	160 mils (4.0 mm) on the selvage edge		(ASTM D5147)
Weight	126 lbs/roll		

TECHNICAL INFORMATION

Hail Resistance	Pass class SH		(FM Global)
Tensile Strength	Longitudinal (MD)	81 lbf/in	(ASTM D5147)
	Transversal (CMD)	73 lbf/in	
Elongation	Longitudinal (MD)	53 %	(ASTM D5147)
	Transversal (CMD)	58 %	
Dimensional Stability	Longitudinal (MD)	0.0 %	(ASTM D5147)
	Transversal (CMD)	0.1 %	
Tear Strength	Longitudinal (MD)	149 lbf	(ASTM D5147)
	Transversal (CMD)	119 lbf	
Joint Shear Resistance	Longitudinal (MD)	74.23 lbf/in (650 N/50 mm)	(EN 12317-1)
	Transversal (CMD)	68.21 lbf/in (550 N/50 mm)	
External Fire Performance	Class A		(UL 790)
Behavior after Artificial Weathering	Flexibility at low temperature after heat conditioned at 70 °C:	-13 °F (-25 °C)	(ASTM D5147)

Solar Reflectance	Initial	3-year	(ASTM E1980-11)
	0.68	0.61	
Thermal Emittance	Initial	3-year	(ASTM E1980-11)
	0.89	0.89	
Solar Reflectance Index	Initial	3-year	(ASTM E1980-11)
	82	73	
Durability	Loss of granules	0.1 gr	(ASTM D5147)
Low Temperature Bend	≤ -13 °F (-25 °C)		(ASTM D5147)

APPLICATION INFORMATION

Ambient Air Temperature	Minimum	41°F (5°C)
	Maximum	104°F (40°C)
Relative Air Humidity	80% max.	
Substrate Temperature	Minimum	41°F (5°C)
	Maximum	104°F (40°C)

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

AVAILABILITY/WARRANTY

AVAILABILITY

From Sika Corporation – Roofing Authorized Applicators when used within SikaShield systems.

WARRANTY

Upon successful completion of the installed roof by the Sika Authorized Applicator in compliance with Sika requirements, Sika Corporation will provide a warranty to the Building Owner via the Sika Authorized Applicator.

LIMITATIONS

- At low temperatures, the membrane becomes less flexible. Be careful when unrolling to avoid damaging the membrane
- Footwear with spikes or sharp protrusions may puncture the membrane. Use footwear with a flat profile when walking over the membrane.
- The polyester melts at 500°F (260°C). If it is damaged through overheating, the membrane becomes unusable. Keep moving the flame while torching to avoid overheating the membrane.
- Make sure to heat the membrane sufficiently. If it is not sufficiently heated, the adhesion to the substrate, between layers or on the overlaps will be reduced. If

the membrane does not adhere to other elements, lift and re-torch the unbonded areas.

- When applying the membranes at temperatures lower than 41°F (5°C), use heating equipment to ensure that the substrate temperature is within the given temperature range.
- For slopes with an inclination greater than 15 %, multi-layered roofs must be carefully designed and, if necessary, integrated with mechanical fastenings or termination bars.
- If a seasonal symbol is printed on the roll's label, it is advisable to use the membrane during the indicated season.
- When laying the membrane at high temperatures, the integral adhesive will become 'tacky' and may restrict laying operations.

ENVIRONMENTAL, HEALTH AND SAFETY

REGULATION (EC) NO 1907/2006 - REACH

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

SYSTEM DESIGN

Consider the following when designing the system:

- The supporting structure must be of sufficient structural strength to support all new and existing layers of the system build-up.
- If used as a roof system, the complete system must be designed to withstand and be secured against wind uplift loadings.

SUBSTRATE CONDITION

The substrate surface must be uniform, firm, smooth and free of any sharp protrusion or burrs, clean, dry, free of grease, laitance, oil, dust and loosely adhering particles.

APPLICATION

ALIGNMENT

To avoid coinciding joints, lay the membranes parallel to one another. When applying on another bituminous membrane, make sure to straddle the overlaps of the previous layer.

1. Unroll the membrane.
2. Align the membrane.
3. Re-roll the membrane before application.

MEMBRANE OVERLAPS

1. Overlap the membranes by a minimum of 4" (100 mm) on the sides and 6" (150 mm) on each end or as specified by the supplier.
2. At the end overlap, cut off a corner measuring 4" (100 mm) per side at an angle of 45°.

COLD ADHESIVE BONDING

1. Apply the recommended adhesive at the required consumption onto the surface.
2. Apply the membrane onto the adhesive while still fresh. It cannot be cured.
3. Roll the surface of the applied membrane with a roller from the center to the edge to remove any air bubbles.
4. Seal the overlaps with hot melt or by torching/welding.

Suitable substrates for cold adhesion

- Concrete
- Metal
- Perlite screed
- Bituminous membranes with a smooth surface
- Brick masonry
- Cementitious screeds
- Plasterboards
- Plasters

HOT ADHESIVE BONDING (MOPPING)

Apply the hot melt at the required consumption onto the surface.

1. Note: Refer to the individual Product Data Sheet of the hot melt adhesive.
2. Apply the membrane onto the hot melt while still hot.
3. Roll the surface of the applied membrane with a roller from the center to the edge to remove any air bubbles.
4. Seal the overlaps with hot melt or by torching.

Suitable substrates for mopping

- Concrete
- Coverboard
- Bituminous membranes with a smooth surface
- Coatings (check the compatibility)
- Brick masonry
- Cementitious screeds

NOTE: This membrane is compatible with different asphalt types. Contact Sika® Technical Services for information on choosing the right one for your project.

DETAILING

Use a sharp knife to cut in all details such as internal and external corners, upstands, vent pipes, drains, support metalwork etc.

Refer to the relevant method statement for further information on detailing.

MAINTENANCE

Standard maintenance of SikaShield system should include regular inspections of flashings, drains and terminations sealants at least twice a year and after each storm.

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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Product Data Sheet

SikaShield® HB79 MGF 4 mm
May 2025, Version 01.03
020920011960000049

SikaShieldHB79MGF4mm-en-US-(05-2025)-1-3.pdf



PRODUCT DATA SHEET

SikaShield® E54 SF 3 mm

118 mil SBS-modified bituminous base ply, cold/mop-applied

PRODUCT DESCRIPTION

SikaShield® E54 SF 3 mm is a 118 mil thick SBS modified bituminous waterproofing membrane. It is reinforced with a non-woven polyester fabric dimensionally stabilized with fiberglass and is flexible at -0.4°F (-18°C). The top surface is coated with a smooth surface, which ensures the bond of the overlying layer. The underside of the product has a burn-off film for easy torch application or a non-woven polypropylene fabric for cold or hot application.

USES

The Product is used as a base or intermediate ply roofing membrane for:

- Flat and sloped roofs
- Inverted roofs
- New construction and refurbishment projects
- Single slab or prefabricated
- Stressed skin structures

CHARACTERISTICS / ADVANTAGES

- Double reinforcement
- No cant strip needed
- Excellent dimensional stability
- Easy to install by various methods (torch, cold and mop)
- Fully bonded
- High durability
- Good mechanical properties (tensile, tear, shear)

APPROVALS / STANDARDS

- Meets or exceeds the ASTM D6163, Type I, Grade S
- Underwriters Laboratory (UL)
- FM Global

PRODUCT INFORMATION

Chemical Base	SBS-modified bitumen		
Reinforcing Material	non-woven spunbond polyester fabric stabilized with fiberglass		
Packaging	Roll width	39.4" (1.0 m)	(ASTM D5147)
	Roll length	32.8 ft (10.0 m)	
Shelf Life	36 months from date of production		
Storage Conditions	The Product must be stored in original unopened and undamaged packaging in dry conditions and temperatures between 41°F (5°C) and 95°F (35°C). Store in a vertical position. Do not stack pallets of the rolls on top of each other, or under pallets of any other materials during transport or storage. Always refer to packaging.		
Top surface	Sand		
Bottom Surface	Non-woven olypropylene fabric (SF). The "PE" version features a polyethylene burn-off foil for torch application		
Effective Thickness	118 mil (3.0 mm)		(ASTM D5147)
Weight	88 lb/roll		

TECHNICAL INFORMATION

Tensile Strength	Longitudinal (MD)	69.7 lbf/in	(ASTM D5147)
	Transversal (CMD)	56.1 lbf/in	
Dimensional Stability	Longitudinal (MD)	0.1 %	(ASTM D5147)
	Transversal (CMD)	0.1 %	
Tear Strength	Longitudinal (MD)	117 lbf	(ASTM D5147)
	Transversal (CMD)	80 lbf	
External Fire Performance	Class A		(UL 790)
Permeability to Water Vapor	0.6 ng/(Pa·s·m²) 0.01 Perms		(ASTM E96)
Flow resistance	≥ 249.8 °F (121 °C)		(ASTM D5147)
Permeability to air	0.000002 [L/(Pa·m²·s)] at 75 Pa		(ASTM E2178)
Low Temperature Bend	≤ -0.4°F (-18°C)		(ASTM D5147)
Elongation at maximum tensile force	Longitudinal (MD)	59.3 %	(ASTM D5147)
	Transversal (CMD)	64.2 %	

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

USES

- At low temperatures, the membrane becomes less flexible. Be careful when unrolling to avoid damaging the membrane.
- Footwear with spikes or sharp protrusions may puncture the membrane. Use footwear with a flat profile when walking over the membrane.

- The reinforcement melts at 500°F (260°C). If it is damaged through overheating, the membrane becomes unusable. Keep moving the flame while torching to avoid overheating the membrane.
- Make sure to heat the membrane sufficiently. If it is not sufficiently heated, the adhesion to the substrate, between layers or on the overlaps will be reduced. If the membrane does not adhere to other elements, lift and retorch the unbonded areas.
- When applying the membranes at temperatures lower than 41°F (5°C), use heating equipment to ensure that the substrate temperature is within the given temperature range.
- For slopes with an inclination greater than 15 %, multi-layered roofs must be carefully designed and, if necessary, integrated with mechanical fastenings.
- If a seasonal symbol is printed on the roll's label, it is advisable to use the membrane during the indicated season.
- When laying the membrane at high temperatures, the integral adhesive will become 'tacky' and may restrict laying operations.

AVAILABILITY/WARRANTY

AVAILABILITY

From Sika Corporation – Roofing Authorized Applicators when used within SikaShield systems.

WARRANTY

Upon successful completion of the installed roof by the Sika Authorized Applicator in compliance with Sika requirements, Sika Corporation will provide a warranty to the Building Owner via the Sika Authorized Applicator.

LIMITATIONS

- At low temperatures, the membrane becomes less flexible. Be careful when unrolling to avoid damaging the membrane.
- Footwear with spikes or sharp protrusions may puncture the membrane. Use footwear with a flat profile when walking over the membrane.
- The reinforcement melts at 500°F (260°C). If it is damaged through overheating, the membrane becomes unusable. Keep moving the flame while torching to avoid overheating the membrane.
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season.

- When laying the membrane at high temperatures, the integral adhesive will become 'tacky' and may restrict laying operations.

ENVIRONMENTAL, HEALTH AND SAFETY

REGULATION (EC) NO 1907/2006 - REACH

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

SYSTEM DESIGN

Consider the following when designing the system:

- The supporting structure must be of sufficient structural strength to support all new and existing layers of the system build-up.
- If used as a roof system, the complete system must be designed to withstand and be secured against wind uplift loadings.

SUBSTRATE CONDITION

The substrate surface must be uniform, firm, smooth and free of any sharp protrusion or burrs, clean, dry, free of grease, laitance, oil, dust and loosely adhering particles.

APPLICATION

ALIGNMENT

To avoid coinciding joints, lay the membranes parallel to one another. When applying on another bituminous membrane, make sure to straddle the overlaps of the previous layer.

1. Unroll the membrane.
2. Align the membrane.
3. Re-roll the membrane before application.

MEMBRANE OVERLAPS

1. Overlap the membranes by a minimum of 4" (100 mm) on the sides and 6" (150 mm) on each end or as specified by the supplier.
2. At the end overlap, cut off a corner measuring 4" (100 mm) per side at an angle of 45°.

Product Data Sheet

SikaShield® E54 SF 3 mm

February 2025, Version 01.02

020920011960000050

COLD ADHESIVE BONDING

1. Apply the recommended adhesive at the required consumption onto the surface.
2. Apply the membrane onto the adhesive while still fresh. It cannot be cured.
3. Roll the surface of the applied membrane with a roller from the center to the edge to remove any air bubbles.
4. Seal the overlaps with hot melt or by torching/welding.

Suitable substrates for cold adhesion

- Concrete
- Metal
- Perlite screed
- Bituminous membranes with a smooth surface
- Brick masonry
- Cementitious screeds
- Plasterboards
- Plasters

HOT ADHESIVE BONDING (MOPPING)

Apply the hot melt at the required consumption onto the surface.

1. Note: Refer to the individual Product Data Sheet of the hot melt adhesive.
2. Apply the membrane onto the hot melt while still hot.
3. Roll the surface of the applied membrane with a roller from the center to the edge to remove any air bubbles.
4. Seal the overlaps with hot melt or by torching.

Suitable substrates for mopping

- Concrete
- Bituminous membranes with a smooth surface
- Coatings (check the compatibility)
- Brick masonry
- Cementitious screeds

NOTE: This membrane is compatible with different asphalt types. Contact Sika® Technical Services for information on choosing the right one for your project.

FASTENING

When used as a roofing sheet, the membrane can be mechanically fixed to the substrate by using the correct type of fasteners.

The number of fixings, type and position depend on wind uplift forces to be resisted, pull-out strength of the fixing screws, the elastic limit of the membrane and the appropriate safety factors.

Contact Sika Technical Service for additional information.

Suitable substrates for fastening

- Concrete
- Wood
- Metal
- Perlite screed
- Bituminous membranes
- Coatings (check the compatibility)

DETAILING

Use a sharp knife to cut in all details such as internal and external corners, upstands, vent pipes, drains, support metalwork etc.

Refer to the relevant method statement for further information on detailing.

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

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SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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Product Data Sheet

SikaShield® E54 SF 3 mm
February 2025, Version 01.02
020920011960000050

SikaShieldE54SF3mm-en-US-(02-2025)-1-2.pdf





Pre-Bid Sign In Sheet

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Project: CLARENDON COUNTY EMERGENCY MANAGEMENT AND 911 COMMUNICATIONS
DISPATCH CENTER
Project No.: 24001
Date: 15 May 2025
Location: Clarendon County Administration Building

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Pre-Bid Sign In Sheet

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DISPATCH CENTER
Project No.: 24001
Date: 15 May 2025
Location: Clarendon County Administration Building

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