



ADDENDUM

04 | 250128

School District of Lancaster

McCaskey High School Stadium Projects
Lancaster, PA

Date of Addendum: 28 January, 2025

Marotta/Main Architects Project No.
24-SDL-03

The original Project Manuals and Drawings dated 06 January, 2025 for the project noted above, are amended as noted in this Addendum No. 04.

Receipt of this Addendum shall be acknowledged by inserting its number and date in the space provided on the Bid Form.

This Addendum consists of 5 Pages and all attachments listed.

CLARIFICATIONS

- 04.01 Roller Window Shades are to be provided at locations indicated on Drawing 1/A8.7.
- 04.02 All site utilities for domestic water, sanitary and gas are by the GC
- 04.03 All site electrical and data work, NOT under track or field improvements are to be provided by the EC
- 04.04 We do not anticipate any tapping fees for extending to / tying -in water and sanitary from or to functioning existing services.
- 04.05 For the gas line that will be extended from existing service in JP McCaskey HS to the new meter, GC piping inspections required by Utility Company shall be obtained by the GC.

SPECIFICATIONS

VOLUME 1 – LEGAL SPECIFICATIONS

- 04.06 Refer to INDEX, ADD the following Specifications Sections:

DIVISION 31 – EARTHWORK

- 31 10 00 SITE CLEARING 6 Pages
- 31 20 00 EARTH MOVING 11 Pages

DIVISION 32 – EXTERIOR IMPROVEMENTS

- 32 92 00 TURFS AND GRASSES 7 Pages

DIVISION 33 - UTILITIES

- 33 10 00 FACILITY WATER DISTRIBUTION 9 Pages
- 33 30 00 FACILITY SANITARY SEWERS 5 Pages
- 33 30 01 ACCEPTANCE TESTING 5 Pages

- 04.07 Refer to Specification Section 00 01 15 LIST OF DRAWINGS, ADD the following drawings in the CIVIL DRAWINGS section:

CSK-05 SANITARY SEWER PLAN & PROFILE
CSK-06 UTILITY DETAILS

CSK-07 UTILITY DETAILS

- 04.08 Refer to Specifications Section 00 11 13 ADVERTISEMENT TO BID, REVISE 1.2.A.1 to read –
'1. Bid Date: February 5, 2025.'
- 04.09 Refer to Specifications Section 00 31 13 PRELIMINARY SCHEDULE, REVISE 1.1.C, Bids Received
item to – '05 February, 2025 Bids Received'
- 04.10 Refer to Specification Section 01 12 00 MULTIPLE CONTRACT SUMMARY, ADD 1.6.A.4.b.4) to
read as follows: 'Any existing surfaces disturbed by installation of utilities is to be patched by the
prime performing the installation.'

VOLUME 2 – TECHNICAL SPECIFICATIONS

- 04.11 Refer to Specifications Section 09 65 66 Resilient Athletic Flooring 2.2.B, ADD item 6 – '6. Dynamic
Sports DynaFit.'
- 04.12 Refer to Specifications Section 10 51 26 Solid Plastic Storage Lockers, ADD 2.1.B to read as follows:
'B. Manufacturers: Subject to compliance with requirements, the following may be incorporated into
the Work:
1. Elite Storage Products.
 2. Columbia Lockers
- 04.13 ADD the following Specification Sections to the technical specifications:
- 31 10 00 SITE CLEARING
 - 31 20 00 EARTH MOVING
 - 32 92 00 TURFS AND GRASSES
 - 33 10 00 FACILITY WATER DISTRIBUTION
 - 33 30 00 FACILITY SANITARY SEWERS
 - 33 30 01 ACCEPTANCE TESTING

VOLUME 3 – MEP & SITE/CIVIL SPECIFICATIONS

- 04.14 Refer to Specification Section 23 02 50 – 2.4 REFRIGERANT PIPING
- a. ADD Paragraph C: Insulation for all refrigerant piping 4" and smaller shall be 1-inch thickness.
- 04.15 Refer to Specification Section 26 06 20 SCHEDULES FOR ELECTRICAL DISTRIBUTION
EQUIPMENT, and make the following changes:
- a. Panel VL1; Ckt #54/56/58: ADD 3P.30A breaker with Note #3 for "Rec - Band Trailer".
- 04.16 Refer to Specification Section 26 06 50 – LUMINAIRE SCHEDULE
- a. Luminaire Type SW1: DELETE "-COR" from Catalog Number. DELETE "w/ Corner Mount
Backbox" from Description. ADD "7'-6"" to Mtg. Height. ADD Note 7.
- 04.17 Refer to Specification Section 28 16 00 – INTRUSION DETECTION SYSTEM
- a. REPLACE specification with attached specification.

DRAWINGS

ARCHITECTURAL DRAWINGS

- 04.18 Refer to sketch ASK-07, referencing Drawing AD1.2 FIRST FLOOR DEMOLITION PLAN for clouded revisions.
- 04.19 Refer to Drawing A1.2 FIRST FLOOR PLAN for clouded revisions.
- a. ADD detail mark 8/A1.3 along column line 22 between column lines 5 – 19
 - b. ADD detail mark 8/A1.3 along column 19 between column 20 – 22
 - c. ADD partition type M4 in room V-101 ATHLETIC TEAM ROOM behind lockers along the North and West wall.
 - d. ADD concrete infill between column line M and L, 2 and 3. – Refer to sketch ASK-07.
- 04.20 Refer to sketch ASK-06, referencing Drawing A1.3 SECOND FLOOR PLAN – ADD detail 8/A1.3.
- 04.21 Refer to Drawings A2.1 VISITOR EXTERIOR ELEVATION. – REISSUE sheet in its entirety.
- a. Refer to REPAIR LEGEND – ADD note 'F: REMOVE ANCHOR / INFILL HOLE.'
 - b. Refer to ELEVATION 1/A2.1 Visitor South Elevation. ADD Repair notes A and F.
 - c. Refer to ELEVATION 1/A2.1 VISITOR SOUTH ELEVATION. ADD post repair note.
 - d. Refer to ELEVATION 3/A2.1 VISITOR WEST ELEVATION. Add note 'REMOVE AND REINSTALL RAILS AS REQUIRED FOR STUCCO REPAIR. SCRAPE, PREP AND PAINT. EACH SIDE' at wall mounted rails.

STRUCTURAL DRAWINGS

- 04.22 Refer to Drawing S1.1 Framing Plans –
- a. CLARIFICATION: The new concrete slab on metal deck (S-1) shown in 1/S1.1 is to be located between column lines O to K and 2 to 4.
 - b. CLARIFICATION: No slab is present above the new press box framing shown in 2/S1.1.

PLUMBING DRAWINGS

- 04.23 Refer to Drawing P2.1, FIRST FLOOR PLANS - PLUMBING
- a. Replace drawing with attached drawing.
- 04.24 Refer to Drawing P2.2, SECOND FLOOR PLAN - PLUMBING
- a. Replace drawing with attached drawing.
- 04.25 Refer to Drawing P2.3, HIGH SCHOOL FIRST FLOOR PLUMBING PLAN
- a. Drawing notes # 1., ADD to the last sentence; FOR 24,912 MBH.
- 04.26 Refer to Drawing P3.1, ENLARGED PLUMBING PLANS
- a. Replace drawing with attached drawing.

MECHANICAL DRAWINGS

No items.

ELECTRICAL DRAWINGS

04.27 Refer to Drawing E1.1, SITE PLAN - ELECTRICAL DEMOLITION

- a. Add General Note #8 as follows: The EC is responsible for demolition of all underground conduits as indicated on Electrical Demolition plans; including associated concrete encasement. The EC is responsible for removal of all associated debris from the site. The EC is responsible for backfilling as noted above.
- b. Add General Note #9 as follows: Underground conduits and associated concrete encasement may be abandoned in place where not interfering with new construction.

04.28 Refer to Drawing E1.2, SITE PLAN - ELECTRICAL

- a. Replace drawing with attached drawing.

04.29 Refer to Drawing E1.4, SITE PLAN - ATHLETIC LIGHTING

- a. Three Drawing Note #18's listed. Renumber #18, #19, #20 respectively.

04.30 Refer to Drawing E3.1, FIRST FLOOR PLANS - LIGHTING

- a. Replace drawing with attached drawing.

04.31 Refer to Drawing E5.1, FIRST FLOOR PLANS - SYSTEMS

- a. Replace drawing with attached drawing.

04.32 Refer to Drawing E7.1, POWER RISER DIAGRAM

- a. Add Keynote #12 tag at Generator G1.

END OF ADDENDUM 04

Respectfully Submitted,

Connie King, AIA, ALEP, GGP
Marotta/Main Architects, Inc.

Attachments:

28 16 00 INTRUSION DETECTION SYSTEM
31 10 00 SITE CLEARING
31 20 00 EARTH MOVING
32 92 00 TURFS AND GRASSES
33 10 00 FACILITY WATER DISTRIBUTION
33 30 00 FACILITY SANITARY SEWERS
33 30 01 ACCEPTANCE TESTING

A2.1 VISITOR EXTERIOR ELEVATIONS
ASK-06 DAMPROOFING AT VISITOR SIDE FOUNDATION
ASK-07 RAISED CONCRETE FLOOR HOME BLEACHERS

P2.1 FIRST FLOOR PLANS - PLUMBING
P2.2 SECOND FLOOR PLAN – PLUMBING
P3.1 ENLARGED PLUMBING PLANS

E1.2 SITE PLAN - ELECTRICAL
E3.1 FIRST FLOOR PLANS - LIGHTING
E5.1 FIRST FLOOR PLANS – SYSTEMS

CSK-05 SANITARY SEWER PLAN & PROFILE
CSK-06 UTILITY DETAILS
CSK-07 UTILITY DETAILS

SECTION 28 16 00 – INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. *Integrated Digital Alarm Communicator (DACS), including but not limited to the following:*
 - 1. *Control panel*
 - 2. *Enclosures*
 - 3. *Lock and key*
 - 4. *Power Supplies*
 - 5. *Accessories required to provide a complete DACS*
 - 6. *System O and I manual*
 - 7. *System programming*
 - 8. *Batteries*
 - 9. *Wiring*
 - 10. *Conduits*
- B. *The Contractor shall be responsible for identifying requirements for permits from the local police department for the installation of the alarm system specified herein and shall assist the Owner in obtaining the relevant alarm permits.*

1.2 SYSTEM DESCRIPTION

- A. *A functionally complete, integrated Digital Alarm Communicator System (DACS) per manufacturer's guidelines, codes, and specification requirements.*
 - 1. *The DACS shall include a Control Panel with built-in, supervised telephone line interface.*
 - 2. *The DACS shall include recording and retention of event information in a dedicated event log.*
 - 3. *The DACS shall incorporate an integral real-time clock, calendar, and a test timer.*
 - 4. *The DACS shall incorporate battery charging capabilities with supervision of battery voltage and battery leads.*
 - 5. *The DACS shall accommodate a time / event-based scheduling system.*
 - 6. *The DACS shall be capable of supervision of peripheral devices and communications interfaces.*
 - 7. *The DACS shall support the connection and reporting of intrusion, fire detection and access control devices to a remote Digital Alarm Communicator Receiver (DACR).*
 - 8. *The DACS shall accommodate configuration and operation of separate, independent areas.*
 - 9. *The DACS shall accommodate hard-wired or wireless point expansion via expansion point interface modules and RF receivers.*
 - 10. *The DACS shall have electrically supervised detection loops and power supplies with battery(s) maintenance. This supervision shall be programmable for the purposes of reporting this information to the DACR.*
 - 11. *The DACS shall be capable of monitoring and switching to active telephone lines when trying to establish communications with the DACR and transmitting a report.*
 - 12. *The DACS shall be capable of sending (manually or automatically) test and status reports to remote DACRs.*
 - 13. *The DACS shall be able to accommodate test, diagnostics, and configuration programming functions locally or remotely via a portable programmer or a computer running the Remote Programming Software (RPS).*
 - 14. *The DACS shall annunciate alarm, trouble, service reminders, and other relevant system status messages in custom English text at the ACC.*

1.3 REFERENCES

- A. *National Electric Code, Article 760.*
- B. *National Fire Alarm Code (NFPA 72).*

- C. **Administrative Council for Terminal Attachments (ACTA):**
 - 1. **ANSI/TIA-968-A-2002 Technical Requirements for Connection of Terminal Equipment to the Telephone Network.**
- D. **American National Standards Institute (ANSI):**
 - 1. **ANSI C63.4 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.**
- E. **California State Fire Marshal (CSFM):**
 - 1. **Title 19, California Code of Regulations, Building Material Listing Program (BML).**
- F. **Federal Communications Commission (FCC):**
 - 1. **Title 47 C.F.R. Part 15; Class B – Radiated and Conducted Emissions.**
 - 2. **Title 47 C.F.R. Part 68; rules governing the connection of Terminal Equipment (TE) to the Public Switched Telephone Network (PSTN).**
- G. **The National Institute of Standards and Technology of the United States of America (NIST):**
 - 1. **Federal Information Processing Standards Publications 197 (FIPS 197) –Advanced Encryption Standard (AES).**
- H. **International Organization for Standardization (ISO):**
 - 1. **9001 - Quality System.**
- I. **Underwriters Laboratories, Inc. (UL):**
 - 1. **UL 50 - Enclosures for Electrical Equipment.**
 - 2. **UL 294 – Access Control System Units.**
 - 3. **UL 365 - Police Station Connected Burglar Alarm Units and Systems.**
 - 4. **UL 609 - Local Burglar Alarm Units and Systems.**
 - 5. **UL 864 - Control Units System for Fire-Protective Signaling System.**
 - 6. **UL 985 - Household Fire Warning System Units.**
 - 7. **UL 1023 - Household Burglar Alarm System Units.**
 - 8. **UL 1076 – Proprietary Burglar Alarm Units and Systems**
 - 9. **UL 1610 - Central Station Burglar-Alarm Units.**
 - 10. **UL 60950-1 - Information Technology Equipment - Safety.**
 - 11. **UL 636 – Hold up alarms**

1.4 SUBMITTALS

- A. **Product Data: Manufacturer's data, user and installation manuals for all equipment and software programs including computer equipment and other equipment required for complete Digital Alarm Communicator and Access Control System (DACS), including:**
 - 1. **Preparation instructions and recommendations.**
 - 2. **Storage and handling requirements and recommendations.**
 - 3. **Installation methods.**
- B. **Shop Drawings: Shop drawings shall provide details of proposed system and the work to be provided. Include point-to-point drawings of systems and wiring diagrams of individual devices.**
 - 1. **Detailed wiring diagrams and system description.**
 - 2. **System device locations on architectural floor plans.**
 - 3. **Full Schematic of system, including wiring information for all devices.**
- C. **Documentation to be submitted by the Contractor upon completion of system installation:**
 - 1. **"As-builts": Upon completion of installation, the Contractor shall prepare "as-built" drawings of the system. These "As-builts" shall be 30" by 42" format mylar reproducible drawings of each floor plan indicating exact device locations, panel terminations, cable routes and wire numbers as tagged and color-coded on the cable tag.**
 - a. **Additionally, final point-to-point wiring diagrams of each type of device (on 30" by 42" format) shall be included in the "as-builts".**
 - b. **"As-builts" shall be submitted to the Owner for approval prior to the system acceptance walk-through.**

2. *Operation and maintenance manuals: Three sets of operating manuals shall be provided explaining the operation and maintenance of the system.*
3. *Parts list.*
4. *Maintenance required and maintenance schedule.*

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualification:

1. *The system shall be the standard product of one manufacturer, and the manufacturer shall have been in business manufacturing similar products for at least 5 years.*
2. *Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard.*

B. Installer Qualification:

1. *Minimum of five years' experience installing access control, surveillance and security systems and devices.*
2. *After-sales support: The Contractor shall be a factory-authorized and trained dealer of the system and shall be factory-trained and certified to maintain/repair the system after system acceptance.*

C. System Requirements:

1. *All equipment, systems, and materials furnished and installed under this section shall be installed in accordance with the applicable standards of:*
 - a. *National Codes: NEC, NFPA, UBC, BOCA, SBCCI, IBC as applicable.*
 - b. *Approvals and listings: UL, FM, ANSI SIA CP-01, CSFM, NYC-CoA, as applicable.*
 - c. *Local Authorities Having Jurisdiction (AHJ).*

1.6 DELIVERY, STORAGE, AND HANDLING

- A. *Deliver materials in manufacturer's original, unopened, undamaged containers; and unharmed original identification labels.*
- B. *Store products in manufacturer's unopened packaging until ready for installation.*
- C. *Protect store materials from environmental and temperature conditions following manufacturer's instructions.*
- D. *Handle and operate products and systems according to manufacturer's instructions.*

1.7 PROJECT CONDITIONS

- A. *Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.*

1.8 WARRANTY

- A. *All components, parts, and assemblies supplied by the manufacturers and installed by the Contractor shall be warranted against defects in material and workmanship for a period of at least 12 months (parts and labor), commencing upon date of acceptance by Owner. A qualified factory-trained service representative shall provide warranty service.*

B. Service/Maintenance:

1. System maintenance and repair of system or workmanship defects during the warranty period shall be provided by the Contractor free of charge (parts and labor).
2. Periodic testing of the system shall be carried out on a monthly or quarterly basis to ensure the integrity of the control panel, the sensing devices, and the telephone lines.
3. The installer shall correct any system defect within six hours of receipt of call from the Owner.
4. Extended service/maintenance agreements shall be offered by the Contractor for up to four years after the warranty expires. The agreement shall be renewable monthly, quarterly, or yearly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:** Bosch Security Systems, Inc.; 130 Perinton Parkway; Fairport, NY 14450. ASD. Toll Free Tel: 800-289-0096. Tel: 585-223-4060. Email: request_info@presales.support@us.bosch.com. Web: www.boschsecurity.us.

- B. Substitutions:** Not permitted.

2.2 GENERAL DESCRIPTION

A. Control Panel and Features:

1. The DACS control panel shall be Bosch Security Systems, Inc. model D9412GV4 comprising a fully integrated intrusion, fire, and access control system. The control panel shall support the following:
 - a. The DACS system is capable of being utilized as a combination Intrusion and Fire system per code. Fully integrated intrusion, access and fire functions allow users to interface with 1 system instead of 3
 - b. Integrated Telephone Line Interface with programmable options for signaling and supervision.
 - c. Conettix IP based communication option provides high-speed, secure alarm transport and control.
 - d. 32 programmable areas with perimeter and interior partitioning.
 - e. 8 on-board, class B hardwired points with expansion capability for a total of 246 wired or wireless points.
 - f. Compatibility with touch-screen color LCD, vacuum fluorescent, ATM style LCD or LED style Alarm Command Centers.
 - g. Local or remote programming, test, and diagnostic capability via a computer running the Remote Programming Software (RPS).
 - h. The system shall support the use of an Apple iOS device for control. Functions to include arming, disarming, control of outputs, lock, unlock, cycle and secure access doors.
 - i. Integrated real time clock, calendar, test timer and programmable scheduling capability for relay control and automatic execution of system functions based on a time / event.
 - j. Provide 1.4 amps of power for standby operation and 2 amps of alarm power, both rated at 12 VDC.
 - k. 2 wet-contact relay outputs and 1 Auxiliary wet-contact relay output with expansion capability for up to an additional 128 dry-contact relay outputs.
 - l. Integrated battery charger with reverse hook up protection, battery supervision and battery deep discharge protection.
 - m. Supervision of peripheral devices and communications interface(s).

B. Point Functionality and Expansion:

1. Each point in the system shall be programmable to provide the following type of response in the system:
 - a. Always on (24-hour response).
 - b. On when the system is Master Armed.

- c. *Only on when the system is Perimeter Armed.*
 - d. *Displays / Does Not Display at the ACC when the point is activated.*
 - e. *Provides / Does Not Provide entry warning tone.*
 - f. *Sounds / Does Not Sound audible alarm indication.*
 - g. *The Point is by-passable / not by-passable.*
 - h. *Alarm Verification with programmable verification time.*
 - i. *Relay activation by Point.*
 - j. *Provides / Does Not Provide "watch point" capability.*
 - k. *Provides Swinger Bypass.*
 - l. *Defers Bypass Report.*
 - m. *Can return to the system after being force armed and then restoring.*
 - n. *Can return to the system after being bypassed and then restoring.*
- 2. *The DACS shall be capable of supporting "group zoning". Group zoning refers to the combining of points into a separately identifiable and separately annunciated (programmable text) areas.*
 - 3. *The DACS shall be capable of allowing variable point response times via programming. Point response times shall be programmable over a range of 300 milliseconds to 4.5 seconds.*
 - 4. *The DACS shall have the capability to expand up to 246 separately identifiable points, of which 8 are on-board and 238 are off-board wired or wireless addressable points connected to multiplexed backbone trunks via wired modules and/or wireless receivers.*
 - a. *The 8 on-board points shall be able to accommodate powered class B functionality using a powered loop interface module.*
 - b. *Point Expansion Modules (Wired and Wireless) shall be able to be located remote to the main panel to a maximum distance of 1000 feet.*
 - 5. *The DACS shall have the capability to expand up to 75 separately identifiable points, of which 8 are on-board and 67 are off-board addressable points connected to multiplexed backbone trunks via wired modules and/or wireless receivers.*
 - a. *The 8 on-board points shall be able to accommodate powered class B functionality using a powered loop interface module.*
 - b. *Point Expansion Modules (Wired and Wireless) shall be able to be located remote to the main panel to a maximum distance of 1000 feet.*
 - 6. *Capability to expand up to 40 separately identifiable points, of which 8 are on-board and 32 are off-board addressable points connected to multiplexed backbone trunks via wired modules and/or wireless receivers.*
 - a. *The 8 on-board points shall be able to accommodate powered class B functionality using a powered loop interface module.*
 - b. *Point Expansion Modules (Wired and Wireless) shall be able to be located remote to the main panel to a maximum distance of 1000 feet.*
 - 7. *Capability to expand up to 40 separately-identifiable points of which 8 are on-board points and 32 are off-board addressable points connected to point expansion modules and/or wireless receivers.*
 - 8. *Capability to expand up to 24 separately-identifiable points of which 8 are on-board points and 16 are off-board addressable points connected to point expansion modules and/or wireless receivers*
- C. *Areas/Accounts:*
- 1. *The DACS shall support 8 independent areas. Each of the 8 areas shall have custom text associated with the armed state, disarmed state and point-off-normal state.*
 - 2. *All areas must be capable of Master (All) and/or Perimeter (Part) arming (excluding predefined Interior protection).*
 - 3. *The DACS shall be capable of logically grouping 1 or more points into an area, or conversely, dividing 2 or more points into two or more areas.*
 - 4. *Any area shall be configurable to allow arming by specific users when a programmable number of devices are faulted or bypassed.*
 - 5. *Areas shall be independently controlled by their corresponding ACC.*
 - 6. *Area(s) shall accommodate assignment of independent account numbers to define annunciation, control, and reporting functions.*
 - 7. *The DACS shall be capable of linking multiple areas to a shared area which may be automatically controlled (hallway or lobby).*
 - 8. *The DACS shall accommodate conditional area arming dependent on the state of other areas (master or associate). Any area can be configured for perimeter and interior arming, not requiring a separate area for this function.*

- D. Output Relay Expansion:** The DACS shall provide the capability for output relay expansion using relay expansion modules. Independent control of relay functions by area shall be possible through programming assignments.
1. The DACS shall be capable of activating 64 additional relay outputs for auxiliary functions based on its classifications (area vs. panel wide). Output Expansion Modules shall be able to be located remote to the main panel to a maximum distance of 1000'. 8 relays (Form C) are to be provided per octo-relay module
 2. The DACS shall be capable of controlling relays and automatically executing system functions based on a time / event scheduling program. The program can be hour, day of week or day of month based.
 3. Relays and other outputs may be programmed to follow up to 14 different area conditions or up to 12 panel conditions. Relays may also be programmed to follow individual points or groups of points.
 4. The DACS shall support 4 different types of alarm output selections: Steady, Pulsed, California Standard, and Temporal Code 3.
- E. Scheduling:** The DACS shall support scheduling capabilities with the following characteristics:
1. Arm / Disarm specific area(s) based on open/close windows.
 2. Bypass / Un-bypass point(s).
 3. Activate / Deactivate relay(s).
 4. Send test reports.
 5. Up to 4 programmable holiday schedules of 366 days each (includes leap year). Based on the holiday settings, different time windows for open/close and other system functions can be executed.
 6. Automatic adjustment of system clock for daylight savings time.
 7. Turn an Access Authority Level On / Off.
 8. Hold a Door Open (unlocked and shunted).
 9. Secure a Door Closed (locked, no valid cards will allow entry).
 10. Return a Door to Normal Operation (locked, valid cards will allow entry).
 11. Turn recording of Access Granted events On/ Off (and transmittal if routing is ON).
 12. Turn recording of Access Denied events On/ Off (and transmittal if routing is ON).
- F. Alarm Command Centers:**
1. The DACS shall accommodate connection with up to 32 ACCs, each capable of displaying custom English text on touch screen liquid crystal or vacuum fluorescent (VF) displays.
 2. The Alarm Command Centers shall accommodate viewing and configuration of system parameters including:
 - a. Point Parameters:
 - 1) Point Selection between one and the maximum number of points in the control panel.
 - 2) Point Registration to allow system response from a specific physical point on any one of the expansion modules; On-board, Point expansion modules (wired or wireless), and Access.
 - 3) Wireless points shall be able to be enrolled in the system via an auto learn feature.
 - b. Event Routing Parameters to allow programming of up to 4 report routing groups as well as configuration of primary and secondary paths.
 3. The DACS shall accommodate connection with up to 8 ACCs, each capable of displaying custom English text on liquid crystal or vacuum fluorescent (VF) displays.
 4. The ACC's shall be capable of displaying point status, arm/disarm status, and carry out user command functions.
 5. The ACC can be programmed to respond to the entry of any of the specifically authorized user passcodes.
 6. The ACCs shall be able to be configured to control a specific area, or group of areas, or all areas in the system.
 7. The ACCs shall be able to be temporarily re-addressed to view the status of a remote area.
 8. The ACC's shall be able to provide different audible tones for Intrusion, Fire alarms, and system troubles
- G. User Passcodes and Authority:** Passcodes shall be programmable with authority levels to allow users to operate any or all areas.
1. Up to 999 different passcodes shall be accommodated.

2. *Up to 399 different passcodes shall be accommodated.*
 3. *Up to 99 different passcodes shall be accommodated*
 4. *Up to 32 different passcodes shall be accommodated.*
 5. *Each passcode shall be 3 to 6 digits (variable) and be assigned a 16-character user name that shall be printed on the local printer and DACR with associated opening and closing reports from the user.*
 6. *Each passcode shall be 3 to 7 digits (variable).*
 7. *User access to programmable levels of authority assigned to the user passcode. Additionally, the system shall have the capability to assign to the user passcode, a different authority level in each of the areas. A service passcode can be assigned to the servicing agent allowing the agent limited access to system functions. User-programmable / activated functions include:*
 - a. *Arming the system: All areas, specific area(s) only, perimeter instant, perimeter delayed, perimeter partial, watch mode, and arming the system with a duress passcode.*
 - b. *Disarming the system: All areas, specific area(s) only and disarming with a duress passcode.*
 - c. *Viewing system status: Faulted points, event memory, bypassed points, area status and point status.*
 - d. *Implementation functions: Bypass a point, un-bypass a point, reset sensors, silence bell, activating relays, initiating the remote programming function locally to allow programming the system from a remote location.*
 - e. *Testing the system: Local Walk test, Service Walk test, Fire test, send report to remote DACR to check the telephone link, and programming the time and date for the next test report transmission.*
 - f. *Change system parameters: ACC display brightness, system time and date, and add/delete/change passcodes.*
 - g. *Extend the closing time of the system.*
 - h. *Transmitting special alerts and activating audible and visible signals.*
 - i. *Executing multiple commands / ACC keystrokes from a single Menu / Command List item. This function shall be able to have a 16-character (alphanumeric) title to identify it on the ACC display.*
 - j. *Editing of time / event-based scheduling program from the ACC.*
 - k. *The DACS shall also provide a "service menu" to implement functions such as viewing and printing the system log, displaying the system firmware revision number, and defaulting (toggling) text displays between custom and default text displays for troubleshooting.*
 8. *The DACS shall allow users to change their own user passcode from the Alarm Command Center (ACC). Managers shall be capable of changing the user passcodes and authority assignments by area of other users from the ACC.*
 9. *The DACS shall incorporate a programmable "Passcode Follows Scope" feature to allow users to arm or disarm only the area they are entering with one simple command or control all areas from one ACC.*
- H. *Communication: The DACS shall be capable of reporting system events and supervisory reports including alarm, trouble, missing modules, restorals, system status, AC failure, battery status to primary and secondary off-site DACR's. The following features shall be supported.*
1. *The DACS shall be capable of communicating via dial-up analog telephone lines, over a LAN/WAN/Internet using a wired network interface module, or over a cellular network using a GSM/GPRS interface module.*
 2. *The DACS shall be capable of communicating via dial-up analog telephone lines, over a LAN/WAN/Internet using a wired dialer capture network interface module.*
 3. *The Bosch Modemlla² communications format shall be utilized for optimum system performance. The Modemlla² format provides the maximum data information to the receiver for alarms, troubles, restorals, bypasses, relay activation, opening/closings, and card access. The detailed information includes the point numbers with text, peripheral device numbers, user numbers with text, and area information. As an alternative format, Contact ID may be used when a non-Bosch receiver is used although it will include less detailed information like point or user text.*
 4. *The DACS shall have the capability of communicating with up to 8 different DACRs using up to 4 different phone numbers, up to 24-digits in length and/or 4 URL/IP addresses over a network.*

5. *The DACS shall have the capability of communicating with up to 5 different DACRs using up to 4 different phone numbers, up to 32-digits in length or 1 IP address using a dialer capture network interface module.*
 6. *The DACS shall support 2 telephone lines using a dual phone line module. The lines shall be capable of being alternated for the transmission of consecutive events.*
 7. *The DACS shall report to a Commercial Central Station that is using a Bosch D6600 Receiver/Gateway or a Bosch D6100i Receiver using ModemIIIa² as a preferred format or Contact ID as an alternate format.*
 8. *The DACR shall provide the transmission information sent from the DACS that includes alarms, troubles, restorals, bypasses, relay activation, opening/closings, and card access. When using the ModemIIIa² format the detailed information includes the point numbers with text, peripheral device numbers, user numbers with text, and area information.*
 9. *The DACS reports shall be classified, by event, into eleven subcategories or "report groups". Each group represents similar types of events. Individual events within each group shall be selectively enabled or disabled for transmission. The eleven report groups shall be as follows:*
 - a. *Fire Reports*
 - b. *Burglar Reports*
 - c. *User Reports*
 - d. *Test Reports*
 - e. *Diagnostic Reports*
 - f. *Relay Reports*
 - g. *Auto Function Reports*
 - h. *RPS Reports*
 - i. *Point Reports*
 - j. *User Change Reports*
 - k. *Access Reports*
 10. *The DACS shall be capable of listening to the telephone line when calls are answered by other devices on the premises side of the phone line and determining if a special tone is being sent from RPS (Remote Programming Software) and intercepting the call for RPS Sessions.*
 11. *The DACS shall be have the capability to verify the integrity of the remote communications path and switch to alternate paths when a communications failure occurs.*
 12. *The DACS shall be capable of unattended mode of operation whereby programming and configuration updates are automatically transferred using the Remote Programming Software (RPS). These updates can initiate from either the control panel or the remote computer using RPS.*
- I. *Network Communication: The DACS shall be capable of network communications over a LAN, WAN, Intranet, or the Internet. The system shall include supervision of the network communication utilizing configurable periodic heartbeats to the Digital Alarm Communications Receiver (DACR). The DACR shall provide notification of the loss of communications from a networked system after a programmable timeframe since the last communication. The notification options shall be programmable and include local annunciation or indication to automation software.*
1. *The network interface module shall be capable of supporting Dynamic Host Communication Protocol (DHCP) to obtain an IP Address.*
 2. *The system shall support a method of authentication between the control panel and the receiver to ensure that the control panel has not been compromised or replaced.*
 3. *The network interface modules shall be capable of supporting encryption using a minimum of 128-bit AES Encryption (Rijndael) certified by NIST (National Institute of Standards and Technology).*
 4. *The network interface modules shall support a 10/100BaseT connection to an Ethernet network.*
 5. *The control panel shall be capable of network communication with a programmable poll time to send periodic heartbeats to the receiver, programmable ACK Wait time, and programmable retry time. In the situation where a communication path is unsuccessful, the control panel shall be capable of attempting backup communication through an available communication method to the same receiver or a backup receiver.*
 - a. *The control panel shall have the ability to automatically adjust the heartbeat rate of a backup path that is using GPRS to the heartbeat rate of the primary path in case of a primary path failure. Upon restoral of the primary path, the heartbeat rate of the backup path shall automatically restore to the original rate. This allows a system utilizing GPRS communications to keep the wireless charges low.*

- b. *The network communication between the control panel and the receiver shall use Modemilla².*
 - c. *The control panel shall be capable of two-way communication using a wired network interface module with a 10/100BaseT on a LAN/WAN/Internet configuration or with a wireless GPRS module on the Internet.*
 - d. *The control panel shall be capable of configuring the destination of the receiver using a URL or static IP Address.*
 - e. *The control panel shall be capable of using DNS to lookup the IP Address of the receiver when programmed with a URL.*
 - f. *The control panel shall support UPnP for automated Port Forward configuration in the router where the control panel is installed.*
 - g. *The control panel shall support AutoIP to enable the RPS software to connect to the control panel locally using an IP Direct connection.*
 - h. *The control panel shall support configuration of the IP parameters from the keypad eliminating the need for a PC to configure the IP device.*
 - i. *The control panel shall support network diagnostics from a keypad to allow local testing of network connectivity. The diagnostics should include, Ethernet cable connected, gateway configuration ok, DNS lookup operational, and external network connectivity (such as the Internet) operational.*
 - j. *The system shall be capable of meeting DCID 6/9 and UL 2050 standards.*
- J. *Event Log: The DACS shall maintain a log of events indicating time, day, month, year, type of event, account number, area number, user ID, point text, user text and primary/secondary event route. The system shall allow the following characteristics:*
- 1. *The DACS shall be capable of storing up to 1000 events*
 - 2. *The DACS shall be capable of storing up to 254 events*
 - 3. *The DACS shall support the printing of these events on up to 3 local printers.*
 - 4. *he DACS shall support the printing of these events on a local printer.*
 - 5. *The DACS shall support viewing of logs locally at the ACC and remotely via an upload to a remote central station computer running the RPS software.*
 - 6. *The DACS shall provide notification via a report to the DACR when the event log reaches a programmable "percent full capacity". This allows retrieval of stored events via RPS to prevent any loss of event history.*
 - 7. *Group, signal type and area can route events to specific printers.*
 - 8. *Each DACR shall be designated as a primary, backup, or duplicate destination for each report group. Assigning an event to multiple routing groups provides for duplicate destinations for the event. The transmission of grouped events allows the reporting of different types of information to different remote DACRs.*
- K. *Testing, Diagnostic, and Programming Facilities: The DACS shall be capable of sending (manually or automatically) test and status reports to remote DACRs.*
- 1. *The DACS shall be capable of sending automatic tests daily, weekly or once every 28 days. Automatic test times shall be programmable to provide an offset of up to 24 hours from the current time.*
 - 2. *Automatic test reports shall be programmable to be deferred by one test interval if any other report is transmitted in the current interval.*
 - 3. *Automatic test reports and remote system access for diagnostics shall be supported via a remote central station computer with Remote Programming Software (RPS).*
 - 4. *The DACS shall be programmable locally or remotely. Programming shall be accomplished via a command center or a computer with a remote programmer and diagnostic software package (RPS).*
 - 5. *The DACS shall allow an on-site user to initiate remote programming while on-line with the servicing location. The remote programming device must provide a compare feature and allow for downloading either the stored program or the (un)modified program copied from the panel.*
 - 6. *The DACS shall allow the local programming option to be disabled and must provide a method to program a panel while no one is on premises, when the panel shares a line with an answering machine.*
 - 7. *The DACS shall accommodate IP Diagnostic to verify settings and operation of the network interface modules; Host name, MAC address, IPV4 address assignment. The IP Connection test shall include; Link test to verify physical cable integrity, Ping test to verify gateway response, ping test to verify address on the internet.*

8. *Wireless point diagnostics shall include signal strength and device states of registered wireless points in the system.*
9. *The number of system-testing and programming sessions shall be restricted via the use of program locking features and passwords. Passcode protection in excess of sixteen million combinations is required.*
10. *New modules support enhanced diagnostics through RPS*
- L. *Miscellaneous Features: Programmable alarm output timer, 31 programmable entry delay times, exit delay programmable by area, individually programmable point of protection text, point bypassing, key switch arming capability with LED outputs, and fire verification.*
- M. *False Alarm Reduction: The DACS shall comply with all ANSI SIA CP-01 requirements for false alarm reduction*
- N. *User-Programmable Features: The DACS shall provide a menu driven interface to provide a user-friendly command structure for programming / customizing the system to the operational criteria of the application. The DACS shall be capable of being operated via:*
 1. *The Command Structure.*
 2. *Menu / Command List.*

2.3 SYSTEM INTERFACE REQUIREMENTS

- A. *Grounding: The Contractor shall properly earth ground the DACS to prevent electrostatic charges and other transient electrical surges from damaging the DACS panel.*
- B. *Primary power: The Contractor shall provide a dedicated 120 VAC power circuit to the DACS system. This circuit shall be connected to the emergency power system. The 120 VAC is stepped down to power the DACS panel using a class two, plug-in transformer. This power circuit shall be properly rated to continuously power all points and functions indefinitely in full alarm condition.*
- C. *Primary power supervision: When the primary power source fails, the system can be configured to report an "AC Fail" message to a commercial central station.*
 1. *The message can also be programmed to "tag-along" with another message transmitted to the central station.*
 2. *The system will always display a loss of primary power on the ACC and may be configured to provide additional audible warning.*
 3. *The transmission delay of this message is programmable from 5 seconds to 86 minutes with an optional 6 to 12-hour transmission delay*
- D. *Secondary power (standby battery): The Contractor shall provide adequate battery power as defined by the relevant application criteria, (UL 864 and UL 985 for alarm installations or NFPA 72 chapters for fire applications). Appropriate battery chargers shall be provided consistent with the battery back-up capacity. The most current accepted version of NFPA 72 and any applicable local codes or AHJ requirements must be met accordingly.*
- E. *Secondary power supervision: When the secondary power source experiences an 85% depletion of its standby capacity, the system can be configured to report a "Low Battery" message to a commercial central station. The system will always display a low battery condition on the ACC and may be configured to provide additional audible warning.*
- F. *Telephone interface: The control panel in the DACS shall be equipped with a phone line monitor and shall interface with the phone lines via RJ-31X jacks for supervision of the telephone line connection.*
 1. *The telephone line interface shall conform with FCC rules (Title 47 C.F.R. part 68).*
 2. *When a telephone line is determined to be out of service by the DACS panel, the event will be annunciated locally on the ACC and transmitted to the central station over the alternate communications interface. The transmission delay of this message is programmable from ten to two-hundred forty seconds.*
 3. *When a telephone line is determined to be out of service by the DACS panel, the event will be annunciated locally based on programming options*
 4. *A telephone line switching module shall be used to interface to a second telephone line.*

- G. *Auxiliary function control interfaces: The DACS shall accommodate auxiliary functions such as activating bells, strobes, or lights and shall be accomplished using the optional application specific relay modules. These auxiliary interfaces shall be electrically isolated to avoid inter-system interferences or damage to the system.*
- H. *Wiring: The contractor shall provide cables consistent with the manufacturer's recommendations. The following general guidelines shall be followed for wiring installation:*
 - 1. *Wiring shall be appropriately color-coded with permanent wire markers. Copper conductors shall be used.*
 - 2. *All signal cables provided under this contract shall be Class II, plenum-rated cable where required. Where subject to mechanical damage, wiring shall be enclosed in metal conduits or surface metallic raceway.*
 - 3. *Data wires shall not be enclosed in conduit or raceways containing AC power wires.*
 - 4. *Where EMI may interfere with the proper operation of the DACS circuits, twisted/shielded cable shall be used.*
- I. *Environmental Conditions: The DACS shall be designed to meet the following environmental conditions:*
 - 1. *The system shall be designed for a storage temperature of -10° C to 70°C (14° F to 158°F).*
 - 2. *The system shall be designed for an operating temperature of 0° C to 50°C (32° F to 120°F).*
 - 3. *The system shall be designed for normal operation in an 85% relative humidity environment.*
 - 4. *The system shall meet or exceed the requirements of FCC rules Title 47 C.F.R. Part 15, Class B devices, and Part 68, IEC EMC directive.*

2.4 HARDWARE

- A. **KEYPADS**
 - 1. *Provide Bosch Model B920 at the locations shown on the Drawings.*
 - a. *SDI2 compatible, 32-character alphanumeric LCD keypad with backlit keyboard, 7 functions keys, 6 navigation keys, alert sounder, system status indicators, and display layout that directs user on operation.*
- B. **DOOR CONTACTS**
 - 1. *Hinged Doors:*
 - a. *Provided with Door Hardware.*
 - 2. *Overhead Doors and Roof Hatches: Nascom Model N200AU/ST, or equal:*
 - a. *Extra Wide-gap magnet.*
 - b. *Extruded anodized aluminum housing suitable for universal mounting.*
 - c. *36" 22AWG wire leads with 24" armored cable protection.*
 - d. *UL634 listed.*

2.5 SYSTEM WIRING

- A. **Manufacturers**
 - 1. *Commscope*
 - 2. *Belden*
 - 3. *West Penn*
- B. *Wiring type and size shall be as recommended by the manufacturer.*
- C. *All wiring shall be plenum rated.*

2.6 ACCESS CONTROL INTERFACE

- A. *Provide equipment and programming as required to interface the access control system specified in section 281300.*

PART 3 - EXECUTION

3.1 EXAMINATION

- A. *Examine areas to receive devices and notify adverse conditions affecting installation or subsequent operation.*
- B. *Do not begin installation until unacceptable conditions are corrected.*
- C. *If preparation is the responsibility of another installer, notify architect of unsatisfactory preparation before proceeding.*
- D. *Ensure selected location is secure and offers protection from accidental damage.*
- E. *Location shall provide reasonable temperature and humidity conditions, free from sources of electrical and electromagnetic interference.*
- F. *Ensure power source is protected against accidental shutoff.*
- G. *Install all equipment and materials in accordance with the "current" recommendations of the manufacturer. The work shall also be in accordance with:*
 - 1. *Installation criteria defined in these specifications and in the construction documents.*
 - 2. *Factory Representative can be the Bosch Security Systems Inc Security Dealer.*
 - 3. *Approved submittals.*
 - 4. *Applicable requirements of referenced standards.*
- H. *The contractor shall provide the following services as part of the contract:*
 - 1. *Supervision of sub-contractors.*
 - 2. *Coordination of other contractors for system-related work (electrical contractor, finish hardware contractor, architect, and general contractor).*
 - 3. *Attending site construction/coordination meetings.*
 - 4. *Keeping updated construction drawings at the construction site.*
 - 5. *Meeting construction deadlines per the construction schedule.*
- I. *Programming of the system shall include the following tasks:*
 - 1. *Programming system configuration parameters (hardware and software, zone/circuit numbers, communication parameters).*
 - 2. *Programming operational parameters such as opening/closing reports and windows, system response text (custom English) displays of events, activation of relays that drive auxiliary devices, and identifying types of zones/loops.*
 - 3. *Programming passcodes according to the authorities and functions defined by the owner.*
 - 4. *Other system programming tasks required by the owner. These additional programming requirements shall be coordinated between the owner and the contractor.*
 - 5. *Operational Testing: The contractor shall perform thorough operational testing and verify that all system components are fully operational.*
 - 6. *Hard-copy System Printout: The contractor shall submit a hard-copy system printout of all components tested and certify 100% operation indicating all devices/panels/units have passed the test criteria set forth by the manufacturer.*
 - 7. *Acceptance Test Plan Form: An acceptance test plan form shall be prepared/provided by the contractor prior to the acceptance walk-through.*
 - 8. *This form shall include separate sections for each device/panel/unit as well as a column indicating the manufacturer's performance allowance/margin, a column indicating the result of the testing performed by the contractor (pass/fail), and an empty column for recording findings during the walk-through.*
 - 9. *Fire Alarm Systems shall comply with NFPA 72 Standards for inspection, testing, and maintenance.*
- J. *The contractor shall certify completion in writing and schedule the commissioning walk-through. The contractor shall provide all the tools and personnel needed to conduct an efficient commissioning process.*

3.2 WIRING METHODS

- A. *Wire Routing: Route all device wiring from each device up into ceiling cavity within metallic conduit in recessed or unfinished areas or within surface raceway for renovated non-fishable areas. Stub all conduits into ceiling cavity and provide protective bushing for each.*
- B. *Cable Routing: Route cable for all device wiring within accessible ceiling cavities. Install in bridle rings at 4' spacing maximum. No cabling is to lie on or attach to ceiling tile, ducts, pipes, conduits or ceiling suspension wires, rods, or structural members. Provide conduit stubs from devices and panels to the ceiling cavities.*
- C. *Route all fire alarm wiring from fire alarm panel within metallic conduit up into nearby ceiling cavity and connect to the wiring system indicated in A and B above. Provide bushings at conduit ends.*
- D. *Provide raceways for cabling in all open structure spaces.*

3.3 FIELD QUALITY CONTROL

- A. *Installation contractor shall submit a written test report that the system has been 100 percent tested and approved. Final test shall be witnessed by the owner, engineer, electrical contractor, chief security officer, and performed by the installation contractor. Final test report shall be received and acknowledged by the owner prior to request for final payment.*
- B. *Provide instruction to the Owner's satisfaction regarding proper use and operation of the system.*
- C. *Determine and report all problems to the manufacturer's customer service department.*

3.4 ADJUSTING

- A. *System maintenance and repair of system or workmanship defects during the warranty period shall be provided by the Contractor free of charge (parts and labor).*
- B. *Periodic testing of the system shall be carried out on a monthly or quarterly basis to ensure the integrity of the control panel, the sensing devices, and the telephone lines.*
- C. *The installer shall correct any system defect within six hours of receipt of call from the Owner.*

3.5 DEMONSTRATION

- A. *Demonstrate at final inspection that surveillance system and devices function properly.*
 - 1. *The Contractor upon completion of installation shall furnish training in the complete operation of the systems.*

3.6 PROTECTION

- A. *Protect installed products until completion of project.*
- B. *Touch-up, repair or replace damaged products before substantial completion.*

END OF SECTION 28 16 00

(Addendum 4)

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Subsurface Investigation: Test pits to determine location of underground site utilities and/or use of private Utility Locator Service.
 - 2. Selective site demolition of existing site improvements, structures, minor site buildings, and utilities at grade, below grade, and above grade.
 - 3. Clearing and grubbing, selective clearing, and selective tree removal and trimming.
 - 4. Small structure salvage and relocation / fence salvage and relocation.
 - 5. Stripping and stockpiling of topsoil.
 - 6. Temporary erosion control measures.
 - 7. Contractor staging, storage, and field office areas.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls"
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Sections "Lawns and Grasses"

1.3 DEFINITIONS

- A. Topsoil: As defined in Division 31 section "Earth Moving".
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 REGULATORY REQUIREMENTS

- A. Conform to Solid Waste Management Act for management and disposal of construction and demolition waste. Hazardous or contaminated materials, as defined by Federal and State regulations or by documents provided by the Owner, shall be disposed of at permitted sites.
 - 1. A Demolition Permit is required prior to demolition, or partial demolition, of any building.
- B. Verify that Owner has obtained NPDES Permit prior to initiating any earth moving activities as defined by PADEP Chapter 102. Complete and submit to the County Conservation District Co-Permittee Application prior to commencing with any earth disturbance activities.
 - 1. Review Erosion and Sediment Control Plan and NPDES Permit requirements. Coordinate meeting, if required by Permit requirements, with appropriate regulatory agencies prior to initiating Work.
- C. Burning or burying brush, trees, and other materials is prohibited.
- D. Conduct Work to ensure minimum interference with roads, streets, walks, and other structures or facilities. Do not close or obstruct streets, walks, or other occupied facilities without permission from authorities having jurisdiction. Employ traffic on site in accordance with Owner's requirements. Employ traffic control measures when working on or along public roadway corridors in accordance with PADOT, Title 67, Chapter 203, when applicable.
- E. Conform to OSHA CFR, Part 26, Subpart B – Construction Standards for excavation for all excavations.

1.5 MATERIAL OWNERSHIP

- A. Except for any materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.6 SUBMITTALS

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- A. Section 013300 - Submittals: Review procedures for submittals.
- B. Submit plan indicating location of test pits, underground utilities uncovered or located by Utility Locator service, type of utility, utility materials, size of pipe or conduit, and elevations of inverts based on project datum.
- C. Submit plan showing location and approximate size of Contractor staging, parking, and field office area. Indicate materials to be used to stabilize temporary parking, staging and field office areas where stabilization will be required.
 - 1. Submit plan showing any proposed modifications to staging, Contractor parking, field office area, and storage area to meet conditions required by the Work if modifications are required to Contractor areas when indicated on the Drawings.
- D. Submit plan, prepared and sealed by a professional engineer registered in the Commonwealth of Pennsylvania where shoring, bracing, or other structural support of existing buildings or structures as required.
- E. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

1.7 QUALITY ASSURANCE

- A. Pre-clearing Meeting: Conduct conference at Project site prior to work commencing.
 - 1. Field mark all individual trees outside of clearing and grubbing limits designated on Drawings to be removed a minimum of two-weeks prior to initiating clearing operations.
 - 2. Notify Owner after individual trees have been marked and limited of clearing field identified.
 - 3. Arrange meeting with Owner, or Owner's representative, to review clearing and tree removal prior to initiating clearing operations. Explain procedures used to remove trees, disposal methods, and locations of on-site burning areas, when permitted.

1.8 SHORING, BRACING, AND UNDERPINNING

- A. Protect all existing utilities, structures, and Work during project, including foundation grouting, sheet piling, shoring, bracing, slab jacking, soil stabilization, and underpinning when working adjacent to existing utilities or structures.
- B. Perform shoring and bracing in accordance with OSHA requirements when excavating.
- C. Review all shoring, bracing, and structure protection operations with Architect prior to beginning the Work.
- D. Repair damage, slumping, or collapse due to removal of supporting soils, aggregates, existing in-place retaining or support structures due to failure to provide appropriate protection of existing structures and facilities.

1.9 QUALIFICATIONS

- A. Assign design, supervision, and maintenance of all structure protection devices to qualified construction specialist.
- B. Assign, or retain, qualified arborist, landscape architect, or equal professional, supervision for pruning existing trees to remain and removal of trees in close proximity to existing trees to remain.

1.10 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

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- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or as directed by Owner.
- C. Utility Locator Service: It is highly recommended that a private utility locator service is used for the Work. Locations of utilities were determined based on limited utility locating, field work and plans of record. Variations in as-built conditions from original designs are possible and should be confirmed prior to construction.
- D. Do not commence site-clearing operations until temporary erosion and sedimentation control measures are in place, and in accordance with the approved Staging Sequence on the Erosion and Sedimentation Control Plans.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect improvements on adjoining properties and Owner's property designated to remain. Provide temporary fencing when required for protection and as required to define or control site access and separate construction activities for Owner's use of site.
- B. Immediately repair or replace temporary construction fencing where damaged and the area of protection cannot be secured due to the damage.
- C. Identify and protect above ground and below ground utilities to remain from damage. Provide protective measures necessary and as required by public utility companies to maintain uninterrupted service.
- D. Protect trees, shrubs, and plant growth to remain as final landscaping. Erect tree protection fencing around specimen trees to remain and perimeter of wooded areas to remain.
 - 1. Critical Root Zone (CRZ): Avoid compacting, excavating, or damaging the Critical Root Zone of all existing trees to remain. The Critical Root Zone is equal to one foot of radius for each one-inch of tree caliper or 100-percent of the tree canopy.
 - a. Replace any existing tree designated to remain damaged by unauthorized operations within the Critical Root Zone with same species tree with caliper equal to 1/3 of the caliper of the damaged tree.
 - 2. Install temporary tree protection fence at perimeter of Critical Root Zone. Maintain fence until final landscaping or other Work requires removal.
 - 3. Install temporary trunk protection fence around trunk of existing specimen trees designated to remain.
- E. Protect benchmarks, property markers, monuments, and existing site structures designated to remain.
- F. Replace existing trees, shrubs, plants and replace or repair site structures designated to remain that are damaged by the Work. Restore damaged structures to their original or better condition as acceptable to parties having jurisdiction.

3.2 COORDINATION

- A. General: Coordinate clearing and demolition Work to avoid interference with Owner's occupation of site and other work.
- B. Utility Services: Coordinate demolition of utility services with installation of temporary utilities, services, and pipelines where required. Do not remove required utilities until temporary utilities, or new Work, has been installed to provide uninterrupted service.

3.3 PREPARATION

- A. Field identify limits of clearing. Notify Architect two weeks prior to beginning clearing operations to permit field review of clearing limits and tagging of trees to remain along clearing perimeter.
- B. Verify that existing plant life to remain is tagged and identified.
- C. Identify a waste area and salvage area for placing removed materials.

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- D. Identify and field delineates limits of pavement removal and partial removal of other site structures and paving.
- E. Verify that all underground utilities have been located in the area of the Work and that all utility companies having jurisdiction have been properly notified in advance of any excavation Work.
- F. Obtain all permits and other approvals required for demolition of buildings, utilities, and site structures where required.

3.4 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to the approved NPDES plans.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.5 TEST PITS

- A. Test pits are required to verify depth of existing charted utilities in project area prior to construction when existing Owner record documents or Drawings do not indicate depth or invert elevations of existing utility lines.
- B. When directed by the Architect, excavate test pits to determine the location of uncharted or incorrectly charted utilities or to determine the invert, depth below grade, or condition of an existing utility line.
 - 1. Contract adjustment will not be considered where excavation and backfilling can be incorporated as part of the Work.
- C. Backfill all test pits after the required information has been obtained and only after field inspection by the Architect.
 - 1. When Architect requests field inspection, barricade the open excavation to prevent accidental encroachment until the field inspection is completed and backfilling authorized.
 - 2. Where Architect authorizes backfilling without field inspection, immediately backfill excavation in accordance with Section 312000.
 - a. The Architect may waive the compaction requirements when the excavation will be reopened for additional Work. Excavation may remain open for a maximum of two-days if Work requiring the uncovered utility will begin within that time. All open excavations shall be barricaded.

3.6 UTILITIES

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

3.7 CLEARING, GRUBBING, AND TREE REMOVAL

- A. General:
 - 1. Do not perform clearing operations until erosion and sediment control facilities are in place. Limit initial clearing to only those areas required for installation of erosion and sediment controls.
- B. Clearing and Grubbing: Clearing and Grubbing includes the complete removal of all trees, shrubs, brush, existing ground cover and grubbing.
 - 1. Perform operations in accordance with regulations pertaining to tree removal and erosion and sedimentation control plans.
 - 2. Clear and grub all wooded areas designated on the Drawings and as required to complete the Work.
 - 3. Cut or fell trees at the perimeter areas to be cleared in a manner that does not damage the canopy or root systems of existing trees to remain along the clearing perimeter.
- C. Understory Clearing: Not Used
- D. Transplanting: Not Used

- E. Stump Removal: Not Used
- F. Disposal of Trees, Shrubs, and Brush: Remove all trees, shrubs, brush, and vegetated material waste resulting from clearing Work from Site. No burning is permitted.

3.8 SITE DEMOLITION

- A. Bituminous Paving: Perform all Work as required to completely remove bituminous pavements, walks, and roadways designated to be removed. Remove all bituminous pavement materials, aggregate base course material, and pavement subdrainage systems when present.
 - 1. Where paving is designated to be partially removed, neatly sawcut at right angles to the pavement surface to form uniform joint between the pavement to be removed and existing pavement to remain.
 - 2. Existing bituminous materials and existing aggregate base course may be recycled and reused as part of the Work. All recycled or reused material shall meet or exceed the specified requirements for new materials.
 - a. Submit test reports or certifications verifying that recycled material meets the specified requirements prior to incorporating recycled or reused materials into the Work.
 - 3. All materials shall be removed from the site following demolition unless such materials will be recycled for incorporation into the Work. If materials do not meet the specified requirements following testing, all rejected materials shall be immediately removed.
 - 4. Crushed bituminous paved material, masonry products, and aggregate may be used for bulk fill if incorporation of such material will not violate any local, state, or federal regulations and such material can be buried to a minimum depth of 24-inches below finished grade.
 - a. Upon approval by the Architect of a plan submitted by the Contractor indicating the extent and location of the requested fill material, including a statement sealed by a registered geotechnical engineer indicating that the use of the material will not adversely impact the structural integrity of the fill in any manner, and a the statement must also indicate that the material will not cause any groundwater, surface water, soil contamination, or adversely affect surface plant growth in any manner.
- B. Utilities: Perform all Work as required to remove existing designated site utilities. Removal includes all pipe, conduit, valves, appurtenances, inlets, and manholes associated with the utility unless designated otherwise to remain as part of the Work or to be abandoned in place.
 - 1. Where partial removal is proposed for later connection or realignment, Contractor shall temporarily plug open end of utility until connection is ready to be made. Where a piped utility has been partially removed and the remaining piped utility will be abandoned, the open of the pipe shall be permanently plugged with concrete or using a standard manufacturers end cap or plug.
 - 2. Notify all public utility companies prior to removing, capping, plugging, or abandoning any public utility or public utility service connection. All work regarding public utility lines shall be performed in accordance with the utility company having jurisdiction.
 - 3. Accurately locate all abandoned utility lines on the project record drawings and note any utility lines that have been removed.
- C. Items for Salvage: No right of property is granted to any materials or structures removed as part of site demolition. Notify Architect prior to removal of salvageable site structures.
 - 1. Schedule of Site Items for Salvage: Not Required.
 - 2. Break loose and remove any footings from items indicated for salvage. Where a footing cannot be removed, or an item designated for salvage cannot be removed without cutting or damage to the item, notify Architect.
 - 3. Designate area for storage of salvage items that will not interfere with Work.

3.9 TOPSOIL STRIPPING AND STOCKPILING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Establish stabilization immediately upon finishing work for the day. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles as indicated on the approved Erosion and Sedimentation Control Plans.

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2. Do not stockpile topsoil within tree protection zones.
3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.10 CONTRACTOR PARKING, STAGING, STORAGE, AND FIELD OFFICES

- A. Locate staging, storage, and field offices as to avoid conflict with other operations. Locate as required to facilitate construction staging. Review location with Architect / Owner prior to placement of temporary aggregate base pavement.
- B. Locate staging, storage, and field office area to minimize interference with Owner's use of site, existing site vehicular traffic, and pedestrian traffic.
- C. Provide contractor parking, staging, storage and field office area where indicated on the Drawings. Size of staging area is approximate and may be modified subject to conditions of the Work. Site area occupied by the Owner shall not be utilized for any purpose unless specifically authorized by the Owner.
- D. Access: Access to construction parking, staging and storage areas shall only be at approved locations. Approved locations include only those areas where a stabilized construction entrance has been indicated on the approved Erosion and Sediment Control Plan.

3.11 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 1. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 31 10 00

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and exterior plants.
 - 2. Excavating and backfilling for buildings and structures.
 - 3. Drainage course for slabs-on-grade.
 - 4. Subbase course for concrete walks and pavements.
 - 5. Subbase and base course for asphalt paving.
 - 6. Subsurface drainage backfill for walls and trenches.
 - 7. Excavating and backfilling for utility trenches.
 - 8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
- B. Related Sections include the following:
 - 1. Division 01 Section "Unit Prices"
 - 2. Division 01 Section "Temporary Facilities and Controls"
 - 3. Division 03 Section "Cast-in-Place Concrete"
 - 4. Division 31 Section "Site Clearing"
 - 5. Division 32 Section "Lawns and Grasses"

1.3 UNIT PRICES

- A. Unit prices for earthwork are included in Division 01 Section "Unit Prices."
- B. Rock Measurement: Excavation on this project is classified. When doing work outside the limit of contract when was authorized by the Owner, the volume of rock will be calculated as outlined in this Section. Volume of rock actually removed, measured in original position, but not to exceed the following. Unit prices for rock excavation include replacement with approved materials.
 - 1. 24 inches outside of concrete forms other than at footings.
 - 2. 12 inches outside of concrete forms at footings.
 - 3. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - 4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5. 6 inches beneath bottom of concrete slabs-on-grade.
 - 6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.4 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

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- E. Clay Liner: Not Used.
 - F. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
 - G. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 - 2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
 - 3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
 - H. Fill: Soil materials used to raise existing grades. Zones are defined as follows:
 - 1. Structural Fill Zone:
 - a. All areas of bulk fill necessary for building construction, slabs on grade, rigid pavement, flexible pavements, retaining walls, detention basin berms, embankment construction, and buffer zones.
 - b. All backfill located within the Structural Fill Zone, foundation wall backfill, and retaining wall backfill, and exterior perimeter of wall backfill zones.
 - c. All utility trenches in any location.
 - 2. Nonstructural Fill Zone: All bulk fills necessary for establishing finished subgrade of areas not scheduled for site improvements, pavements, or structures.
 - I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
 - 2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
 - J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 - K. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement, or a cement concrete or hot-mix asphalt walk.
 - L. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
 - M. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- 1.5 SUBMITTALS
- A. Product Data: For the following:
 - 1. Plastic warning tape.
 - 2. Geotextile.

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- B. Samples: 12-by-12-inch Sample of subdrainage and separation geotextile.
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
- D. Topsoil Test Results: Submit laboratory test results for on-site and imported topsoil materials indicating analysis and recommendations for soil amendments to sustain growth for each seed mix, sod mix, and for trees, shrubs, and ground covers. Analysis shall include testing of the specific criteria specified in Sections 329200. A minimum of one (1) sample shall be submitted to the testing agency per five (5) acres of ground disturbance to determine if any variations exist in the topsoil characteristics.
- E. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.6 QUALITY ASSURANCE

- A. Blasting is prohibited on this site.
- B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548. Owner will retain Geotechnical Testing Agency.

1.7 PROTECTION AND RESTORATION OF PROPERTY AND UTILITIES

- A. Existing walks, fences, roads, buildings, structures, and other site features in or adjacent to the project work area shall be protected during the Work by placing barricades, fencing, or other suitable means to prevent unnecessary destruction or damage.
- B. All excavation equipment and other machinery shall be operated with care to prevent damage to existing structures designated to remain and new construction.
- C. Tractors, bulldozers, and other equipment shall not be operated on existing or newly paved surfaces if such equipment will cut or otherwise damage the paved surface unless required and approved by the Owner. Material storage areas and staging areas located on paved surfaces shall also be established so as not to damage the pavement.
- D. All lawns, paved surfaces, curbing, sidewalks, and other structures that are damaged through the Contractor's operations shall be restored to a condition equal or better than they were found prior to the beginning of the Work at no expense to the Owner by the Contractor that caused the damage. Restoration work shall be completed as promptly as possible following observation of any damage or destruction.
- E. Contractor shall notify all utility companies, pipeline companies, and the Owner to assist in determining the location and protection procedures for utility services and pipelines prior to construction. The Contractor shall be responsible for obtaining and implementing any protection requirements for existing utilities as may be required by the utility company. Underground utilities have been located on the Drawings based upon field survey of surface appurtenances, Owner's drawings, and in accordance with Act 121 of 2008 (as amended). Utility information indicated on the Drawings shall be considered approximate and is provided to advise the Contractor where possible obstructions exist and as to the extent to which these may affect construction. As excavation approaches pipes, conduits, or other underground utilities, manual methods of excavating shall be employed around buried utilities. Where materials cannot be removed by manual methods, the Contractor shall immediately notify the Architect. No additional compensation will be provided for manual excavation around known existing utilities.
- F. The Contractor causing damage to the utility services shall be responsible for all costs including repair, replacement, fines, fees, and penalties, for damage to any existing known utility services. Utility services include phone, CATV, electric, gas, water, sanitary sewer, petroleum, process lines, storm sewers, and all

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other public and private utilities. Should uncharted, or incorrectly charted, piping, conduit, ducts, or utilities be encountered during excavation, the Contractor shall immediately notify the Architect and the utility company for direction and shall cooperate with the Owner and the utility company as to maintain existing services and facilities in operation. Upon discovery of an uncharted utility, the utility from that time forward shall be considered as a known utility and the Contractor will be responsible for any costs associated with additional damage.

- G. If any piping, conduits, ducts, or utilities are damaged during the process of the excavation, immediately begin to make emergency repairs, and notify the proper authorities or persons. Repair damaged utilities to the satisfaction of the utility owner and Architect. To prevent dispute as to the cause of damages, Contractor shall carefully note and properly report such damage.
- H. Where Work will require crossing, excavation over, or connection to existing utility service, the Contractor shall excavate a test pit to accurately determine the elevation and alignment of the existing utility. The Contractor shall immediately provide this information to the Architect. Test pits to determine utility existing utility information shall be provided to the Architect a minimum of three days prior to commencing with the affected portion of the Work unless approved otherwise. The Contractor is responsible for damage to any existing known utility as a result of test pit excavation and no additional compensation will be provided for manually excavating test pits.

1.8 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
 - 1. Notify Architect not less than 72 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
 - 3. Contact utility-locator service for area where Project is located before excavating.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

1.9 CLOSEOUT SUBMITTALS

- A. Section 001770 - Closeout Procedures
- B. Section 002300 - Project Record Documents – Contractor to provide a record plan of all completed sanitary sewer and water improvements. Plan is to be based on a field survey done by a land surveyor licensed in the Commonwealth of Pennsylvania. The survey work shall be prepared using the State Plane Coordinate system and the NAVD 88 vertical datum. The data is to be in AUTOCAD file format compatible. Plans showing this work shall be provided to the Owner and Architect.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups ML,CL,SM, SP, SC or SM or a combination of these groups; free of organic matter and debris, rock, or gravel larger than 4 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. Soils shall have a Liquid Limit less than 45 and a Plasticity Index less than 25. High plasticity CH or MH materials should not be allowed to be placed as structural fill.
- C. Unsatisfactory Soils: ASTM D 2487 Soil Classification Groups CH, MH, OL or OH, a combination of these groups, topsoil, or organic materials. All such materials removed during grading operations should be either stockpiled for later use in non-structural fills or placed in approved disposal areas either on or off-site.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained at a moisture content that will allow the required compaction criteria to be achieved.

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- D. Topsoil: Friable loamy soil (as classified by the U.S. Department of Agriculture Handbook No. 18, Soil Survey Manual); free of subsoil, roots, grass, weeds, stone, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 3 percent and a maximum of 10 percent organic matter. No more than 15 percent by weight shall be larger than a No. 10 U.S. Standard Sieve.
 - 1. To the extent that on-site material meets the requirements, or on-site topsoil or subsoil material can be modified to meet the requirements for the Work, material may be used for topsoil. Imported topsoil material required for the Work due to insufficient quantity of existing on-site material or unsuitability of existing on-site material is permitted.
- E. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; required sizes per Section 321100.
- F. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; required sizes per Section 321100.
- G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; required sizes per Section 321100.
- H. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; required sizes per Section 321100.
- I. Drainage Course: Narrowly graded mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- J. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- K. All imported soil materials must be recovered from approved borrow sources

2.2 CLAY LINER / CLAY CORE

- A. Not Used

2.3 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
 - 3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
 - 4. Tear Strength: 56 lbf; ASTM D 4533.
 - 5. Puncture Strength: 56 lbf; ASTM D 4833.
 - 6. Apparent Opening Size: No. 70 sieve, maximum; ASTM D 4751.
 - 7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
 - 3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
 - 4. Tear Strength: 90 lbf; ASTM D 4533.
 - 5. Puncture Strength: 90 lbf; ASTM D 4833.
 - 6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 - 7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - 8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

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2.4 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

- A. Perform Work regardless of the nature of subsurface materials encountered. Immediately notify the Engineer upon discovery of unnatural subsurface conditions, underground storage tanks, contaminated soils, organic soils, springs, or seeps, buried debris, stumps, or rubbish.
- B. All excavation is considered as "classified excavation" and shall consist of excavating and removing all formations and materials, natural or man-made, irrespective of nature or condition, encountered within the limits of the necessary areas of excavation. Excavate to subgrade elevations. Do not excavate rock until it has been classified and cross sectioned by Owners' representative. If excavated materials intended for fill and backfill include unstable soil, remediate with moisture treatment.
- C. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - 1. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

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D. Definitions to clarify types of subsurface material encountered:

1. Suitable / Satisfactory material is any earthen material consisting of on-site or similar non-organic sands, gravels, clays, silts, and mixtures thereof with a maximum size of six inches (6"). Bedrock that breaks down to specified soil types and sizes during excavation hauling and placement may be considered as suitable material.
2. Unsuitable / Unsatisfactory material is any earthen material containing vegetable or organic silt, topsoil, trees, stumps, certain man-made deposits, or industrial waste, sludge or landfill, or other undesirable materials. This will apply to both "Subgrades" and "Backfills" as well.
3. Unstable material is any earthen material containing excessively high moisture content that otherwise, after going through moisture treatment, can meet the soil requirements established for filling and / or backfilling as suitable / satisfactory material. This will apply to both "Subgrades" and "Backfills" as well.

- E. Where additional excavation is requested and approved by the Owner, Rock is defined as any material that cannot be excavated with the ripper of a D-9R Caterpillar tractor (or equivalent with a minimum operating weight of 90,000 lbs.) without the use of drilling and blasting. Boulders or masses of rock exceeding one and one-half cubic yards in volume shall also be considered rock excavation. This classification does not include loose rock.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
1. Trench width: 2 times the outside diameter of or a minimum of 12" clearance between pipe and trench; whichever is less.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped backfill.
 3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

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3.8 SUBGRADE INSPECTION

- A. Notify Architect when excavations have reached required subgrade.
- B. If Geotechnical Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll subgrade below the building slabs, pavements, and synthetic turf field with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Geotechnical Engineer, and replace with compacted backfill or fill as directed.
- D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect and Geotechnical Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Geotechnical Engineer.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect and Geotechnical Engineer.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
 - 2. Stockpile topsoil to locations indicated on the plans. Provide silt fence down-gradient of soil stockpiles to prevent erosion

3.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities and stormwater improvements for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on trench bottoms and where indicated. Shape soil subgrade of bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Provide 4-inch thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

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- C. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- D. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- E. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 CLAY LINER / CLAY CORE

- A. Not Used

3.14 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to a moisture content that will allow the required compaction criteria to be achieved.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace or scarify and air dry otherwise satisfactory soil material that is too wet to compact to specified compaction criteria.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Soils should be moisture conditioned to within +/- 3 percentage points of optimum moisture content.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Structural Fill: Under structures, building slabs, steps, pavements, and synthetic turf, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent of the maximum dry density obtained in accordance with ASTM Specification D-1557, Standard Proctor Method.
 - 2. Non-Structural Fill: Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at a 90 percent of maximum dry density obtained in accordance with ASTM Specification D-1557, Standard Proctor Method.

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3. For utility trenches compaction rates shall match that of the surrounding fill type either Structural or Non-Structural.
4. Clay Liners: Not Used.

3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1/2 inch.
 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch.

3.18 SUBSURFACE DRAINAGE

- A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage for Synthetic Turf Field."
- B. Subsurface Drain: Place a 6-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick. Extend geotextile and overlap a minimum of 12".
 1. Compact each filter material layer to 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
 1. Place base course material over subbase course under hot-mix asphalt pavement.
 2. Shape subbase and base course to required crown elevations and cross-slope grades.
 3. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
 4. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
 2. Place drainage course 6 inches or less in compacted thickness in a single layer.
 3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.21 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

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- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Geotechnical Engineer.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved, Building Slab and Synthetic Turf Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2500 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify, and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.22 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.23 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Transport surplus satisfactory soil to designated approved storage areas off-site.
- B. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property

END OF SECTION 31 20 00

SECTION 329200 – TURF AND GRASSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Amending Topsoil for general lawn areas.
- B. Seeding, sodding and Mulching for general lawn areas.
- C. Grow-in maintenance for general lawn areas.
- D. Extended maintenance for general lawn areas.

1.2 RELATED SECTIONS

- A. Division 01 Section "Quality Requirements"
- B. Division 31 Section "Earthmoving"

1.3 RELATED DOCUMENTS

- A. Erosion and Sediment Control Narrative and Erosion and Sediment Control Plan: Requirements for temporary seeding, permanent stabilization, site stabilization during construction as approved by the County Conservation District and the Department of Environmental Protection as it relates to the requirements of the NPDES Permit and PADEP Chapter 102 Regulations.

1.4 DEFINITIONS

- A. Weeds: Include, but are not limited to, Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
- B. Erosion and Sediment Control Plan: Includes all plans, narratives, calculations, and conditions of the NPDES Permit, as applicable, as approved and issued by the County Conservation District and Pennsylvania Department of Environmental Protection. A copy of the approved plans and permit must be available on-site at all times during construction.

1.5 STANDARDS

- A. All seed varieties contained in the seed mixtures shall be certified seed by the state where the seed was manufactured.
- B. All chemical applications shall be performed in accordance with local, state, and federal regulations utilizing EPA registered materials and methods of application. All chemical applications shall be performed under the supervision of a Licensed Certified Applicator.
 - 1. All concentrate materials shall be stored in bulk containers and clearly labeled, including material safety data. No containers shall be stored or left on site.
 - 2. Dispense chemicals from concentrate tanks.
 - 3. Provide spillage containment for concentrates and chemicals.

1.6 SUBMITTALS

- A. Manufacturer's Certified Analysis: Submit manufacturer's certified analysis for each seed mix and sod type showing percentage of each variety in mix, percent pure live seed, net weight by variety in mix, age of seed, and date of production.
- B. Soil Test Report: Submit copy of soil test reports as prepared by State Cooperative Extension or approved laboratory determining existing soil parameters as included in Paragraph 2.1.B. Test reports shall be submitted for information only and for evaluating soil amendments recommended by Contractor.
- C. Soil Amendments and Turf Establishment Program: Based on soil test reports, Contractor shall prepare and submit a schedule of soil amendments and fertilization required for each seed mix, time and method of application, a schedule indicating when areas will be seeded, anticipated dates of Substantial Completion, fertilization practices during establishment, application of pre-emergent and post emergent

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herbicides, and other practices that will be employed as part of the Work. The submittal will be considered by the Architect for informational purposes only since the Work of this Section is evaluated by the final establishment of the lawn at the end of the warranty period.

- D. Product Data: Submit product data, manufacturer's installation instructions, specifications, catalog cuts, and manufacturer's standard shop drawings as required by Section 013300.
- E. Sod Certification: Submit certification from sod supplier indicating State of origin, percentage of grass varieties in sod blend, and State sod certification.

1.7 SUBSTITUTIONS

- A. Pre-bid: Not Used
- B. Post-Bid: Requests for substitutions following bid shall be approved by the Architect. Contractor shall submit request in writing, state the reasons for the substitution, and state the variety or mix to be substituted.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in seeding, turf establishment, and maintenance with five years documented experience.

1.9 COORDINATION

- A. The Contractor shall coordinate and schedule Work to permit seeding or sodding to occur during regular planting seasons.
 - 1. General lawn areas and conservation or low maintenance areas: Shall be seeded or sodded during the spring or fall planting seasons as defined in Section 1.10.
- B. Coordinate Work under provisions of Section 013100 and so as to avoid conflict with other operations. Contractor shall be responsible for reseeding any areas damaged due to a failure to coordinate or schedule construction activities.
- C. Coordination with Lawns: Plant material shall be planted after final grades are established and prior to planting of lawns, unless otherwise approved by Architect. If plant materials are installed after lawn work, protect and repair lawn areas damaged by planting operations.

1.10 PLANTING SEASONS

- A. Spring: The spring seeding season is March 15 to May 30. Spring seeding shall be conducted during this period unless approved by the Architect to begin seeding earlier or perform summer seeding. No seeding shall be done on frozen ground, when the air temperature is less than 32 degrees Fahrenheit, or when the soil temperature is less than 50-degrees Fahrenheit regardless of the date of seeding.
- B. Fall: The fall seeding season is August 30 to October 30. Fall seeding shall be conducted during this period unless approved by the Architect to perform seeding earlier or to perform late fall seeding. No seeding shall be done on frozen ground, when the air temperature is less than 32 degrees Fahrenheit, or when the soil temperature is less than 50-degrees Fahrenheit regardless of the date of seeding. Permission to seed November 1 to March 14 will only be given when completion of the project is imminent, and the environmental conditions are conducive to acceptable growth.
- C. Optimal: The optimal seeding season is in the fall, from August 30 to October 30.

1.11 INSPECTION AND ACCEPTANCE

- A. Inspection: Upon completion of the Work as defined in Paragraph 1.13.A, the Contractor shall request an inspection to determine substantial completion. Request shall be made by the Contractor to the Architect in writing and Architect shall complete inspection within two weeks of receipt of request for inspection. Contractor shall clearly note in request for inspection which areas are substantially complete if not requesting inspection for the entire installation.
 - 1. Architect shall issue a notice of Substantial Completion following inspection where Work is substantially in conformance with the specified requirements and Drawings. Minor deficiencies shall be noted, and Contractor shall correct all deficiencies within two-weeks of receiving notice.

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2. Where Architect determines that Work is not substantially complete due to significant deficiencies, Contractor shall take immediate corrective action. Upon completion of corrective measures, Contractor shall again request inspection to determine if Substantial Completion has been obtained.
- B. Contractor shall perform all maintenance activities required as part of Substantial Completion described in Paragraph 1.13.A prior to requesting inspection.

1.12 WARRANTY

- A. Approval of the Architect to perform seeding Work outside of the regular planting seasons when requested by the Contractor shall not void the warranty in any way.
- B. Contractor shall for a period of one year from the Date of Substantial Completion, rebuild, repair, or replace any areas of lawn that have proven defective due to failure to comply with the Specifications in any way. Contractor is not responsible for unsatisfactory areas of lawn due to vandalism, areas that have been damaged by the Institution or Institution's use, or as a result of the Institution's failure to execute maintenance procedures following completion of the Contractor's maintenance period.

1.13 MAINTENANCE SERVICE

- A. Maintain seeded / sodded areas immediately after placement until grass is well established. Contractor shall be responsible for maintenance of all seeded areas until a vigorous, weed free, healthy growing condition is present and Substantial Completion is established.
 1. Seeded Areas: A request for inspection to determine Substantial Completion will not be considered until a vigorous uniform growth over at least 90% of the seeded area is present.
 2. Sodded Areas: A request for inspection to determine substantial completion will not be considered until the sodded area has been in place for a minimum of 45 calendar days and sod exhibits a vigorous growing condition.
- B. When seeding is requested by the Contractor outside of the scheduled planting seasons, the Contractor shall perform additional maintenance, provide additional mulch, frost protection blanket, compost, increased seeding rate, over-seeding, and other Work as required to improve germination conditions at no additional cost to Institution.
- C. When seeding is requested by the Institution outside of the scheduled planting seasons, the Contractor shall perform additional maintenance, provide additional mulch, frost protection blankets, compost, increased seeding rate, over seeding, and other Work as required to improve germination conditions.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. On-site available topsoil or approved imported topsoil. The Contractor shall be responsible for providing satisfactory topsoil as required to meet the quantities necessary for the Work.
- B. Soil Testing: Soil tests shall be done prior seeding. The soil test shall include a mechanical analysis to determine soil texture, pH, magnesium, phosphorus, and potassium. Testing shall also measure organic matter and soluble salts. Topsoil shall not be tested until it has been stripped and stockpiled. All imported topsoil shall be tested before the material is delivered to the site.
- C. Soil Amendments: Contractor shall amend topsoil as determined by the soil tests to adjust soil conditions as require for each variety and species of grass. Soil adjustments shall be made based upon the dominant variety in the seed mix. Where soil tests indicate soil is suitable as tested, no additional amendments are required. Contractor is not required to correct topsoil conditions beyond soil reaction (pH) and fertility (fertilizer). Contractor shall immediately notify Architect where unusual topsoil conditions are present that will be harmful to germination.
 1. Contractor is not required to adjust soil pH by more than 1.5 points. Topsoil required to be adjusted by more than 1.5 points shall be considered an unusual soil condition and additional amendments shall be provided where authorized.
 2. The presence of unusual soil conditions affecting fertility, germination, high or low organic content, soil compaction, or similar conditions does not alleviate the Contractor of responsibility to provide suitable growing and germination conditions. Where unusual soil conditions are identified through soil testing, or during the execution of the Work, Contractor shall immediately notify Architect and propose measures to address deficient soil conditions.

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- D. All topsoil shall be free of stones, lumps, plants, roots, and other debris over 1-1/2-inches. Topsoil shall also be free of weeds, weed seeds, and toxic substances, such as pesticides, which are harmful to plant growth.

2.2 FERTILIZER

- A. All fertilizer shall be uniform in composition, free flowing and suitable for application by mechanical spreaders. Fertilizers shall be delivered in sealed containers showing percentage by weight of all components and shall bear the name, trade name, and warranty of the producer. Application shall be per soil test and as described by Contractor under the provisions of Paragraph 1.6.C.

2.3 LIME

- A. Lime material shall be ground or pulverized limestone that contains at least 50-percent total oxides, calcium oxide plus magnesium oxide. Limestone shall be ground to such fineness that at least 50-percent will pass through a 100-mesh sieve and not less than 98-percent will pass through a 20-mesh sieve. Granular or pelletized lime may also be used subject to the requirements for pulverized limestone. Application shall be per soil test and as described by Contractor under the provisions of Paragraph 1.6.C.

2.4 ORGANIC MATTER

- A. Peat Moss: Type 1 sphagnum peat moss, finely divided with pH of 3.1 - 5.0.
- B. Sedge Peat: Decomposed peat containing no identifiable fibers.
- C. Leaf Compost: Screened and free of trash.
- D. Mushroom Soil Compost: Clean and free of trash.

2.5 SEED MIXES

- A. General Lawn Seed Mixture: Eighty (80) percent turf type Tall Fescue blend of up to three cultivars and twenty (20) percent turf type perennial ryegrass blend of up to three cultivars.
 - 1. Seed shall be a minimum of 80-percent endophyte enhanced, consist of a minimum of 98-percent pure seed with 0-percent weed seed, and have a minimum 90-percent germination rate.
 - 2. Seeding Rate: 10 pounds per 1,000 square feet.
- B. Apply all seed mixtures at half-rates in two cross-directions.

2.6 SOD

- A. Provide only State-approved sod.
- B. Provide machine cut sod with maximum deviation from width and length being 5-percent. Must be big roll sod (4' wide x 62' long). Broken rolls and torn or uneven ends are not acceptable.
- C. Do not provide sod that has been harvested or transplanted under drought conditions.
- D. Sod shall be harvested, delivered, and installed within a period of 24 hours.

2.7 MULCHING MATERIALS

- A. Salt Hay: Free of rot, mildew, noxious weed seeds and shall be small-grained, such as wheat or barley. Apply at a rate to lightly cover soil, approximately 100 lbs. per 1,000 square feet.
- B. Cellulose Fiber: Specially prepared cellulose processed into a uniform fibrous physical state. The fiber mulch, including dye, shall not contain germination or growth inhibiting factors. The material shall be manufactured and processed in such a manner that the cellulose fiber mulch will remain uniform in suspension in water under agitation and will blend with seed, fertilizer, and other additives to form homogenous slurry. The mulch shall cover and hold grass seed in contact with the soil without inhibiting growth of the seedlings. Contractor may utilize other mulches, such as recycle paper and wood blend, recycled paper, and companion binding accessories at his discretion in hydro-seeding. The rate of cellulose fiber shall be 50 pounds per 100 gallons of water or as otherwise recommended by the County Agriculture Cooperative Extension

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2.8 MULCH ANCHORING MATERIALS

- A. Mechanical Method: Tractor-drawn implement designed to punch and anchor mulch into the soil surface.
- B. Cellulose Fiber: Cellulose fiber shall be applied at a net dry weight of 750 pounds per acre.
- C. Liquid Mulch Binder: Non-asphaltic or petroleum based, Reinco, RMB plus (1-800-526-7687), Finn A 500 Hydro-Stik (1-800-873-3321), or equal capable of controlling wind and water erosion of mulch.
- D. Mulch Netting: Prefabricated wood shaving mat with woven photodegradable netting.

2.9 WATER

- A. Clean, potable, free of chemicals or impurities harmful to germination or turf growth.
- B. On-lot water Institution supplied. If either the pressure or supply of public water is insufficient to properly irrigate the lawn area, alternative methods such as tankers and pumps can be considered only upon review and approval by the Institution.

2.10 FROST BLANKET

- A. UV resistant fabric blanket manufactured to assist in germination equal to Fabriscape Frost Blanket (1-800-992-0550).

2.11 HERBICIDE

- A. Broadleaf: Brominal ME4, or equal.
- B. Pre-emergent: Tupersan or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification: Verify that topsoil has been placed to the minimum depths required and that landscape/finished grading has been performed in accordance with Section 311200. Failure to properly prepare topsoil for seeding will result in rejection of seeding by Architect.
- B. Do not sow seed or initiate seeding operations when ground is wet or muddy following a rain event, when the ground surface is excessively dry and dusty, or when wind velocity will result in an uneven distribution of seed.

3.2 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions, at the rate specified in the topsoil analysis, and in accordance with Paragraph 1.6(C).
- B. Apply other soil amendments as required by the topsoil analysis to provide optimum pH range for seed mix. Provide other amendments when required by soil test or as recommended by Contractor and approved by Architect.
- C. Apply amendments after raking of topsoil. Mix all soil amendments thoroughly and evenly into upper two inches of soil. Lightly water following application to assist in dissipation of fertilizer.
- D. Do not apply fertilizer with same equipment used for seeding.

3.3 SEEDING

- A. Dry Application Seeding:
 - 1. Sow seed at the rates specified in one-half rates evenly in two intersecting directions. When using a broadcast or drop-type spreader, rake in lightly to a minimum of one-quarter inch to insure good soil/seed contact. A cultipacker may also be used following broadcast seeding to improve soil/seed contact or alone as the method of dry seeding.
 - 2. Manually sow seed where areas are not accessible to mechanized seeding equipment. Seed shall be evenly distributed and rake in to the top ¼-inch of the soil.

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3. Mulching: Apply mulching material to retain moisture and minimize erosion. Apply straw mulch at a rate to provide ½ to 1-inch thick layer, approximately equal to 100 pounds/1,000 SF or 80-100 bales per acre. When using cellulose fiber as a mulching material, apply at 1,500 pounds per acre. Anchor mulch according to referenced methods.
 4. Apply water with a fine spray after each seeded area has been mulched. Water sufficiently to saturate upper three – four inches of topsoil.
 5. Place signs, rope off, or otherwise protect newly seeded areas from encroachment. Maintain protection until seeded areas are accepted by Institution.
- B. Hydroseeding
1. Mix water, seed, and fertilizer and agitate to homogeneously blend mixture. Contractor shall determine appropriate ratios to meet required seeding application rates as specified and fertilization rates as determined by the soil test.
 2. All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. To prevent fertilizer from burning seed, the slurry shall be applied within 30 minutes from the time it was added to the hydroseeding mix.
 3. Following hydroseeding, utilize a straw blower to apply mulch. Hand mulch areas around trees, shrubs, landscape beds, and other areas where straw mulch is not desired. Apply at the rates specified in Section 3.3.A.3.
 4. Cellulose fiber may be included in the hydroseeding mix for seeding embankments and steep slopes. All slopes greater than four horizontal to one vertical (4:1 or 25%) may be hydroseeded by the seed, fertilizer, water, and cellulose fiber method. All other areas shall be dry seeded or hydroseeded using straw mulch for stabilization as described in paragraph 3.3.B.1-3. The rate of cellulose fiber shall be 50 pounds per 100 gallons of water or as otherwise recommended by the County Agriculture Cooperative Extension.
 5. Protect seeded areas as described in Section 3.3.A.5.
- 3.4 SODDING
- A. Begin sodding once grades have been verified to meet required tolerances.
- B. Lay the first row of sod in a straight line with subsequent rows placed parallel a tight. Lateral joints shall be staggered to promote uniform growth. Do not stretch or overlap sod. Shape sod to form to the line and contour of play areas or infield areas when required. Edge sod if required to form clean line. All work shall be performed using a rubber tracked or turf tire sod installer.
- C. Lightly water sod during installation to prevent drying. Roll sod as sections are completed.
- D. Thoroughly irrigate sod following installation so that the entire sod pad is wet and soil below the pad is wet.
- E. Continue to water until sod is well established. Keep sod moist at all times for two weeks following installation. Watering maybe required several times a day. Continue watering until sod is well rooted.
- F. Roll sod with 2-3 ton pull type roller and turf tractor approximately 45-days following installation.
- 3.5 EROSION CONTROL
- A. Temporary Seeding
1. Perform temporary seeding and mulching work when required to stabilize construction areas in accordance with the requirements of the Erosion and Sediment Control Plan.
 2. Prior to final seeding, any temporarily seeded area shall have the existing stand of turf completely killed to prevent invasive growth of the temporary seed variety in the final seeding.
- B. Geotextile Fabric
1. Install geotextile fabric of type designated on the Drawings or as required for all newly seeded slopes.
 2. Install geotextile fabric of type designated on Drawings for newly graded swales, drainage channels, and detention basin spillways where indicated on the Drawings. Geotextile swale linings indicated on the Drawings have been provided based upon their erosion resistance as compared to the calculated flow velocities for the channel. Where a geotextile lining is not indicated on Drawing, the calculated velocity for that swale is less than 2.0 feet per second and is not considered an erosive velocity under PADEP Chapter 102 Standards. When geotextile stabilization is not indicated, Contractor, at his discretion, may provide a photodegradable or biodegradable seed blanket to assist in germination and reduce the potential for repair and reseeding of the channel due to unanticipated flow velocities. Contractor is responsible for regrading, providing additional topsoil, and reseeding any areas that have washed or eroded regardless if geotextile lining is indicated on the Drawings.

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3. Install geotextile fabric immediately following seeding to reduce the potential for accelerated erosion and seed loss.
 4. Securely lap edges of fabric, provide velocity checks, trench and tuck ends of fabric, and securely staple and stake fabric at intervals recommended by the manufacturer. Manufacturer's instructions and specifications, as approved by Architect, shall be considered the minimum requirement for execution of the Work.
- C. Reseeding and Overseeding
1. During grow-in period, immediately repair areas that have washed or become eroded and perform additional measures as required to stabilize. When directed by Architect, sod may be installed at areas where stabilization is difficult.
 2. Where areas have failed to germinate, Contractor shall overseed or slit-seed bare areas. Method of seeding shall depend on size of area to be reseeded and time of year. All areas seeded after the fall planting season shall be overseeded in the Spring at a rate equal to one-half of the original seeding rate. Overseeding shall be performed when authorized under the provisions of Section 1.13.B.

3.6 MAINTENANCE

- A. The Contractor shall perform all maintenance until the required growing condition is present as specified in Section 1.13.A and Substantial Completion has been established. Maintenance includes the following:
1. Edging: Edge along perimeter of all sidewalks, paved areas, landscape beds, infield areas, and slabs a maximum of three days prior to request for Substantial Completion inspection.
 2. Mowing: Cool season grasses, including bluegrass, tall fescue, and perennial ryegrass shall be maintained at a height of 2-1/2- inches to 3-1/2-inches in the spring and fall in accordance with State Cooperative Extension recommendations. During the summer, the mowing height shall not be less than three inches. No more than 1/3 of the blade shall be removed in a single cutting.
 - a. The Contractor shall perform a minimum of one mowing a minimum of three days prior to requesting an inspection for Substantial Completion for any turf area included in the request for Substantial Completion inspection.
 - b. During the period from initial seeding through Substantial Completion, the Contractor shall be required to mow any contiguous area of grass greater than fifty square feet, including partially completed areas of seeding, when the average height of the grass in the fifty square foot area exceeds four inches.
 3. Fertilizing: Contractor shall fertilize seeded areas as required to assist in germination and establish a thick, healthy stand of grass until Substantial Completion is established. Fertilization shall be based upon the requirements of the turf species, time of year, and soil test results. Contractor shall be responsible for obtaining additional soil test results when required for fertilization between initial seeding and establishment of Substantial Completion.
 4. Lawn/Weed Control: The Contractor shall apply a pre-emergent soil applied herbicide for all spring and summer seedings to control the germination of crabgrass and other annual weed seeds. Prior to a request for Substantial Completion inspection, a post emergent, foliar applied, herbicide shall be applied to prevent the growth of broadleaf weeds in mid to late May to control summer weeds and in late September or early October to control fall weeds. Selection and proper use of herbicides is the Contractor's responsibility. All chemical applications shall be performed under the supervision of a licensed certified applicator.
 5. Insect and Disease Control: The Contractor shall be responsible for monitoring all newly established lawn areas for insect damage and disease and taking any corrective measures as required. The Contractor shall only be responsible for disease and insect control until Substantial Completion is established.
 6. Watering: The Contractor shall be responsible for maintaining sufficient moisture in the soil during germination and as required for turf establishment until Substantial Completion. The Contractor is not required to water any seeded areas but accepts responsibility for the failure of germination, slow germination, unhealthy stands of grass, or sparse vegetation that increases his maintenance responsibilities until substantial completion can be established.
 7. Repair: Repair all areas that have washed or eroded, correct surface irregularities for areas that have settled and pond water, and remedy damage from improper use of herbicides or over fertilization.

END OF SECTION 32 92 00

SECTION 331000 – FACILITY WATER DISTRIBUTION

PART 1 - .0GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Water-distribution piping.
 - 2. Related components outside the building for water service.

1.2 DEFINITIONS

- A. DICT: Ductile Iron Cement Lined
- B. PVC: Polyvinyl Chloride Plastic

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
- C. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.
- B. As-Built Drawings: Prepare an as-built survey of all water piping and facilities installed as part of the Work. As-built survey shall bear the seal of a PA licensed Professional Surveyor.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of utility company supplying water.
 - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

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- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NSF Compliance:
 - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
 - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than seven (7) days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without Architect's and Owner's written permission.

1.9 COORDINATION

- A. Coordinate connection to water service with Architect and Owner.

SECTION 331000 – FACILITY WATER DISTRIBUTION

PART 2 - PRODUCTS

2.1 PVC C900 PIPE AND FITTINGS

- A. PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end. Comply with UL 1285 for fire-service mains if indicated.
 - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.2 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
- B. Tubular-Sleeve Pipe Couplings:
 - 1. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - a. Standard: AWWA C219.
 - b. Center-Sleeve Material: Ductile iron.
 - c. Gasket Material: Natural or synthetic rubber.
 - d. Pressure Rating: 200 psig minimum.
 - e. Metal Component Finish: Corrosion-resistant coating or material.

2.3 GATE VALVES

- A. Gate valves to be in accordance with authority or water utility having jurisdiction.
- B. AWWA, Cast-Iron Gate Valves:
 - 1. Nonrising-Stem, Resilient-Seated Gate Valves:
 - a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - 1) Standard: AWWA C509.
 - 2) Minimum Pressure Rating: 200 psig.
 - 3) Operating Nut: Square; open counterclockwise unless otherwise indicated.
 - 4) End Connections: Mechanical joint or bell end connections.
 - 5) Interior Coating: Complying with AWWA C550.

2.4 GATE VALVE ACCESSORIES AND SPECIALTIES

- A. Valve Boxes: Valve boxes to be in accordance with authority or water utility having jurisdiction.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
 - 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

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- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.5 RESTRAINED JOINTS

- A. Restrained joint pipe and fitting shall meet the specifications contained herein. Restrained joints shall be capable of being deflected after assembly. The joints shall be designed for a water working pressure of 350 psi.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.3 PIPING INSTALLATION

- A. Bury piping with depth of cover in accordance with the plans.
- B. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- C. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at 5' from the building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- D. Install underground piping with restrained joints at horizontal and vertical changes in direction.

3.4 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 - 1. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

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3.5 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - 1. Locking mechanical joints with torque limiting twist-off nuts.
 - 2. Set-screw mechanical retainer glands in combination with concrete thrust blocks
 - 3. Bolted flanged joints.
 - 4. Heat-fused joints.
 - 5. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - 1. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE INSTALLATION

- A. AWWA Valves: Install valves according to authority or water utility company's written instructions.
- B. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

3.7 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of authority or water utility having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

3.8 CONNECTIONS

- A. Connect water-distribution piping to water extended from existing building.

3.9 FIELD QUALITY CONTROL

- A. Refer to Section 333001 "Acceptance Testing" for testing procedures and equipment necessary for Engineer's approval of the installed facilities.

3.10 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench 18-inches above top of underground water-distribution piping in accordance with standard details. Locate below finished grade, directly over piping.

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3.11 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
 - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651.
- B. Prepare reports of purging and disinfecting activities.

3.12 CHLORINATION, FLUSHING, AND DECHLORINATION

- A. Chlorination and disinfection of water-distribution piping shall be in conformance with ANSI/AWWA C651-14. Only the Tablet/Granule and the Continuous Feed methods shall be acceptable.
- B. Flushing: Potable water shall be used for disinfection, hydrostatic pressure testing, and flushing. Drainage shall take place away from the construction or work area. Adequate drainage must be provided during flushing. If applicable, the valve(s) isolating the main from existing system shall be locked out and tagged out to prevent unintentional release of the elevated chlorine residual water used for disinfection.
- C. Dechlorination: When dichlorination is required, it is recommended that any high-velocity flushing be completed prior to disinfection. Dechlorination equipment may not be capable of handling high flows with high levels of chlorine.
- D. Tablet Method:
 - 1. Place calcium hypochlorite granules or tablets in the water main during installation and then filling the main with potable water to create a chlorine solution. This method may be used only if the pipes and appurtenances are kept clean and dry during construction. This method shall NOT be used on solvent-welded plastic or on screwed-joint steel pipe because of the danger of fire or explosion from the reaction of the joint compounds with calcium hypochlorite.
 - 2. Calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft intervals. The quantity of the granules at each location shall be as shown in Table 1 below.

Table 1 Weight of calcium hypochlorite granules to be placed at beginning of main and at each 500-ft (150-m) interval

Pipe Diameter (<i>d</i>)		Calcium Hypochlorite Granules	
<i>in.</i>	<i>(mm)</i>	<i>oz</i>	<i>(g)</i>
4	(100)	1.7	(48)
6	(150)	3.8	(108)
8	(200)	6.7	(190)
10	(250)	10.5	(298)
12	(300)	15.1	(428)
14 and larger	(350 and larger)	$D^2 \times 15.1$	$D^2 \times 428$

Where *D* is the inside pipe diameter, in feet $D = d/12$

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3. Calcium hypochlorite tablets (5-grams) shall be placed in the upstream end of each section of pipe to be disinfected, including branch lines. Also, at least one tablet shall be placed in each hydrant branch and in other appurtenances. The number of 5-g tablets required for each pipe section shall be $0.0012 d^2 L$ rounded to the next higher integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table 2 below shows the number of tablets required for commonly used sizes of pipe. Calcium hypochlorite tablets shall be attached by an adhesive meeting the requirements of NSF/ANSI 61. There shall be adhesive only on the broadside of the tablet attached to the surface of the pipe. Attach tablets inside and at the top of the main. If the tablets are attached before the pipe section is placed in the trench, their positions shall be marked on the pipe exterior to indicate that the pipe has been installed with tablets at the top.

Table 2 Number of 5-g calcium hypochlorite tablets required for dose of 25 mg/L*

Pipe Diameter		Length of Pipe Section, <i>ft (m)</i>				
		13 (4.0) or less	18 (5.5)	20 (6.1)	30 (9.1)	40 (12.2)
<i>in.</i>	<i>(mm)</i>	Number of 5-g Calcium Hypochlorite Tablets				
4	(100)	1	1	1	1	1
6	(150)	1	1	1	2	2
8	(200)	1	2	2	3	4
10	(250)	2	3	3	4	5
12	(300)	3	4	4	6	7
16	(400)	4	6	7	10	13

*Based on 3.25-g available chlorine per tablet

4. When installation has been completed, the main shall be filled with water such that the full pipe velocity is no greater than 1ft/sec. Fill rate must be carefully controlled to ensure tablets do not come loose from pipe. Precautions shall be taken to ensure that air pockets are eliminated.
 5. The chlorinated water shall remain in place for at least 24 hours. If the water temperature is less than 41 degrees Fahrenheit, the water shall remain in the pipe for at least 48 hours. A detectable free chlorine residual (greater than 0.2 mg/L) shall be found at each sampling point after the 24- or 48-hour period.
- E. Continuous-Feed Method of Chlorination
1. The continuous-feed method consists of completely filling the main with potable water, removing air pockets, then flushing the completed main to remove particulates, and refilling the main with potable water that has been chlorinated to 25mg/L. After a 24-hour holding period in the main there shall be a free chlorine residual of not less than 10mg/L.
 2. Before the main is chlorinated, it shall be filled with potable water to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall be greater than or equal to 3.0ft/sec. Table 3 below shows the rates of flow required to produce a velocity of 3ft/sec in commonly used pipes.

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Table 3 Required flow and openings (either taps or hydrants) to flush pipelines at 3.0 ft/sec (0.91 m/sec) (40 psi [276 kPa] residual pressure in water main)*

Pipe Diameter		Flow Required to Produce 3.0 ft/sec (approx.) Velocity in Main		Size of Tap Used, in. (mm)			Number of Hydrant Outlets	
in.	(mm)	gpm	(L/sec)	1 (25)	1½ (38)	2 (51)	2½-in. (64-mm)	4½-in. (114 mm)
4	(100)	120	(7.4)	1	—	—	1	1
6	(150)	260	(16.7)	—	1	—	1	1
8	(200)	470	(29.7)	—	2	—	1	1
10	(250)	730	(46.3)	—	3	2	1	1
12	(300)	1,060	(66.7)	—	—	3	2	1
16	(400)	1,880	(118.6)	—	—	5	2	1

*With a 40-psi (276-kPa) pressure in the main with the hydrant flowing to atmosphere, a 2½-in. (64-mm) hydrant outlet will discharge approximately 1,000 gpm (63.1 L/sec); and a 4½-in. (114-mm) hydrant outlet will discharge approximately 2,500 gpm (160 L/sec).

†Number of taps on pipe based on 3.0-ft/sec discharge through 5 ft (1.5 m) of galvanized iron (GI) pipe with one 90° elbow.

- To chlorinate the main, water shall be supplied through a backflow preventing device. Main shall be filled at a constant, measured rate into the newly installed main. The main shall undergo hydrostatic testing prior to disinfection.
- At a point not more than 10ft downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will not have less than 25mg/L free chlorine. Table 4 below provides the amount of chlorine required for each 100 ft of pipe for various pipe diameters. Solutions with a minimum 1 percent chlorine concentration may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution required 1 lb of calcium hypochlorite in 8 gal of water.

Table 4 Chlorine required to produce an initial 25-mg/L concentration in 100 ft (30.5 m) of pipe by diameter

Pipe Diameter		100% Chlorine		1% Chlorine Solution	
in.	(mm)	lb	(g)	gal	(L)
4	(100)	0.013	(5.9)	0.16	(0.6)
6	(150)	0.030	(13.6)	0.36	(1.4)
8	(200)	0.054	(24.5)	0.65	(2.5)
10	(250)	0.085	(38.6)	1.02	(3.9)
12	(300)	0.120	(54.4)	1.44	(5.4)
16	(400)	0.217	(98.4)	2.60	(9.8)

- Chlorine application shall not cease until the entire main is filled with chlorinated water. The chlorinated water shall be retained in the main for a least 24 hours, during which time valves and hydrants in treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24-hr period, the treated water in all portions of the main shall have a residual of at least 10mg/L.

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F. Bacteriological Testing

1. After hydrostatic testing and chlorination have been completed, purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired. Flushing shall occur until the residual free chlorine level is less than 4.0mg/L and greater than 0.2 mg/L. Bacteriological samples shall be taken in accordance with AWWA C651. Submit water samples in appropriate bottles to authorities having jurisdiction.
2. Disinfection, flushing, and bacteriological processes shall be repeated until all new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired all pass bacteriological testing in accordance with PA DEP requirements.
3. Prepare reports of purging and disinfecting activities.

END OF SECTION 33 10 00

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SECTION 333000 – FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gravity sewer pipe and fittings.

1.2 RELATED SECTIONS

- A. Section 312000 "Earth Moving" for excavation, trenching, installation of warning tape, and other requirements related to utility trenching.
- B. Section 333001 "Acceptance Testing" for requirements for acceptance testing for gravity sewer pipe.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Gravity sewer pipe and fittings.
- B. Shop Drawings: For the following:
 - 1. Gravity sewer pipe.

1.4 QUALITY ASSURANCE

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer, or other representative of the Owner. Such inspection may be made at the place of manufacture, or on the work after delivery, or at both places and the materials shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein; even though samples may have been accepted as satisfactory at the place of manufacture. Material rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All materials which have been damaged after delivery will be rejected, and if already installed, shall be acceptably repaired, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. Gravity Sewer Pipe:
 - 1. All PVC sewer pipe and fittings of a similar type (e.g., solid wall or profile wall) shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM D3034 or ASTM F789 as applicable.
 - 2. Inspections of the pipe may be made by the Engineer or other representatives of the Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job at once.

1.5 CLOSEOUT SUBMITTALS

- A. As-Built Drawings: Prepare an as-built survey of all sanitary sewer piping and facilities installed as part of the Work. As-built survey shall bear the seal of a PA licensed Professional Surveyor, shall meet all

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requirements of the authorities having jurisdiction, and shall be revised and resubmitted until accepted by the authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. While stored, pipe shall be adequately supported from below at not more than 3-ft intervals to prevent deformation. The pipe shall be stored in stacks no higher than that given in the following table:

<u>Pipe Diameter (inches)</u>	<u>Max. No. of Rows Stacked</u>
8 or less	5
12 to 21	4
24 to 30	3
33 to 48	2
54 and larger	1

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than seven (7) days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Architect's written permission.

PART 2 - PRODUCTS

2.1 GRAVITY SEWER PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping, SDR-35 (for depths 0-10 feet below finished grade):
 - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
 - 4. PVC SDR 35 shall be used where depth to top of pipe is less than 10 feet.
- B. PVC Type PSM Sewer Piping, SDR-21 (for depths 10-15 feet below finished grade):
 - 1. Pipe: ASTM D 3034, SDR 21, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - 2. Fittings: ASTM D 3034, PVC with bell ends.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
 - 4. PVC SDR 21 shall be used where depth to top of pipe is greater than 10 feet but less than 15 feet.
- C. Ductile Iron, Epoxy-Lined (DIEL) Sewer Piping (for depths greater than 15 feet):
 - 1. Pipe: ANSI/AWWA C151/A21.51. AWWA C150, Class 50 thickness for buried pipe.
 - 2. Fittings: Ductile Iron, ANSI/AWWA C153/A21.53 and ANSI/AWWA C110/A21.10. Mechanical Joints shall conform to ANSI/AWWA C111/A21/11.
 - 3. Gaskets: ASTM F 477, elastomeric seals.

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4. Pipe Lining: Ductile Iron pipe and fittings shall be coated inside with a ceramic epoxy. Epoxy shall have a permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A, with a test duration of 30 days.
5. Pipe and Fittings Coating: ANSI/AWWA C151/A21.51, factory coated inside and out with bituminous paint, minimum 1 mil dry thickness.
6. Ductile iron pipe shall be used when depth to top of pipe is greater than 15 feet deep.

2.2 CONCRETE

- A. General: Cast-in-place concrete complying with PENNDOT Pub. 408, Section 704:
- B. Reinforcement.
 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from PENNDOT Class AA concrete. Include channels and benches in manholes.
 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: As specified on Construction Drawings.
- D. Ballast and Pipe Supports: PENNDOT Class AA Concrete.
 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.3 VENT AND TRAP

- A. A PVC vent shall be installed no further than 5'-0" from the building wall.
 1. Vent Cap: Shall be constructed of PVC SDR-35 material and shall be the same diameter as the sewer lateral.
- B. A U-bend trap shall be installed below the vent tee.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified on plans and in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

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- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 CONCRETE PLACEMENT

- A. All cast-in-place concrete structures intended to be watertight (manholes, wet wells, tankage, etc.) shall be designed and constructed in accordance with ACI 350.
- B. All cast-in-place concrete related to manhole channels, thrust blocks, anchors, etc. shall be designed and constructed in accordance with ACI 318, and PENNDOT Pub. 408.

3.4 CONNECTIONS

- A. Make connections to existing piping.
 - 1. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.5 IDENTIFICATION

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - 1. Use detectable warning tape over ferrous piping.
 - 2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
 - 1. Submit separate report for each system inspection.
 - 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 - 3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
 - 4. Re-inspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects in accordance with Section 333001 "Acceptance Testing".

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3.7 CLEANING

- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 33 30 00

**24-SDL-03 MCCASKEY HIGH SCHOOL STADIUM PROJECTS
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SECTION 333001 – ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Refer to the following Sections for additional information:
 - 1. Section 312000 "Earth Moving" for excavating, trenching, and backfilling.
 - 2. Section 331000 "Facility Water Distribution" for water pipe, valves, and fittings.
 - 3. Section 333000 "Facility Sanitary Sewers" for gravity sewer pipe and fittings.

1.2 SUMMARY

- A. The Contractor shall provide all labor, materials and equipment required to perform acceptance testing on all materials and equipment provided or constructed as part of the Work to ensure materials and/or equipment will operate as intended.
- B. Acceptance testing includes, but is not limited to, leakage testing, pressure testing, pipe alignment testing (lamp testing), or other method as specified in the Contract Documents or as directed by the Engineer.
- C. Section Includes:
 - 1. Sewer pipe acceptance testing requirements.
 - 2. Water pipe acceptance testing requirements.
 - 3. Procedures for any failed acceptance tests.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The Contractor shall provide all materials and equipment for testing, including but not limited to air, water, meters, gauges, smoke producing equipment, blowers, pumps, compressors, fuel, bulkheads, plugs, caps, traffic control measures, safety equipment, and any other equipment or materials required for acceptance testing.

PART 3 - EXECUTION

3.1 GENERAL

- A. Testing shall be witnessed by the Engineer or their representative.
- B. Sewer lines and manholes must be cleaned before acceptance testing. Any sewer pipe or manhole found to be dirty in the opinion of the Engineer will be cleaned by the Contractor.
- C. Whenever flows are blocked, plugged, pumped, or bypassed, sufficient precautions must be taken to protect the sewer pipes and/or manholes from damage that might be inflicted by sewer surcharging. Further, precautions must be taken to ensure that flow control operations do not cause flooding or damage to public or private property being served by the sanitary sewers involved. No overflows are permitted. The Contractor is responsible for all damages.

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- D. The Contractor is responsible for all damages to Contractor-owned and operated equipment, County facilities, and privately-owned property and facilities caused by malfunctioning plugs, pumps or other Contractor-owned or operated equipment. In the event of a failure or malfunction of Contractor equipment, Contractor is responsible for all work necessary to restore facilities to post-construction condition including but not limited to excavation and restoration of sanitary sewer lines and roadways required to retrieve malfunctioning cameras, plugs and hoses.

3.2 ACCEPTANCE TESTING – SEWER PIPES AND FITTINGS

- A. Prior to the request for inspection by the Engineer, it shall be the Contractor's responsibility to examine all completed sewer pipes and manholes to ensure that they are laid to the proper alignment and grade and free from foreign material. After this has been completed to the satisfaction of the Engineer, he will order tests to be made on all Work built under the Contract. The Contractor shall cooperate and furnish all assistance necessary to perform the tests as specified herein and as directed by the Engineer.
- B. All sewer pipes and manhole base sections shall be backfilled to a depth not less than 2 feet above the top of the pipe prior to all acceptance tests unless otherwise directed by the Engineer.
- C. All sewer pipes shall be tested in individual sections or an accumulation of sections in lengths approved by the Engineer. If multiple sections of pipe are tested at one time, each section shall meet the requirements specified herein.
- D. The Contractor shall not make connections to existing sanitary sewers until after the final inspection and all tests have been accepted.
- E. Leakage Tests for Sewer Pipes
 - 1. Low-Pressure Air Test – Gravity Sewer
 - a. All sewer pipes above the groundwater line with a diameter of 39 inches or less, or as directed by the Engineer, will be tested by the "Low-Pressure Air Test."
 - b. This test will be made by plugging all branch fittings and ends of lateral stubs to withstand internal pressure. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced when required.
 - c. Air shall slowly supplied to the plugged pipe line until the internal air pressure reaches 4.0 pounds per square inch (PSI) greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.
 - d. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 PSI.
 - e. The line shall be considered acceptable if the amount of time is not less than the following formula:
$$T = 0.0850DK/Q,$$
where
 - K = 0.000419DL, but not less than 1.0
 - Q = rate of loss of 0.003 CFM per square foot of internal surface
 - D = Pipe diameter, inches
 - L = Length of pipe being tested, feet

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MINIMUM HOLDING TIME REQUIRED FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.003

Pipe Diameter (inches)	Minimum Time (min:sec)	Length for Minimum Time (feet)	Time for Longer Length (seconds)	Specific Time for Length							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:48	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:53	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:59	38:28	51:17	64:06	76:55	89:44	102:34	115:23
39	18:25	61	18.054 L	30:57	45:09	60:11	75:14	90:16	105:19	120:22	135:24

F. Tracer Wire Tests

1. All new trace wire installed shall be located using typical low frequency line tracing equipment, witnessed by the Engineer. Continuity testing in lieu of actual line tracing is not acceptable.

G. Valve Tests

1. All new valves shall be operated to the fully closed and fully open positions by the Contractor, witnessed by the Engineer.

H. Other Acceptance Tests

1. The Engineer reserves the right to perform other testing as they deem necessary, depending on several factors, including but not limited to failed acceptance tests, site and weather conditions, post-construction CCTV inspection and observances during construction. These tests may include the following:
 - a. Pipe Alignment Test (Lamp Test)
 - (1) Pipe alignment testing consists of visually examining the inside of the pipe between two consecutive manholes with the aid of a light and mirror.
 - (2) A mirror is held at the invert of the pipe and adjusted so the light and barrel of pipe can be seen.
 - (3) The barrel of the pipe shall have no vertical or horizontal deflection.
 - b. Ovality/Deflection Test (Mandrel Test)
 - (1) Ovality/Deflection testing consists of pulling a mandrel, appropriately sized for the pipe diameter(s) constructed, through the constructed pipe sections.
 - (2) The size of the mandrel shall be based on the ovality/deflection requirements specified within the Contract.
 - (3) The mandrel shall pass through all pipe segments without meeting resistance.

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3.3 ACCEPTANCE TESTING – WATER PIPES AND FITTINGS

A. Bacteriological Testing

1. After hydrostatic testing and chlorination have been completed, purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired. Flushing shall occur until the residual free chlorine level is less than 4.0mg/L and greater than 0.2 mg/L. Bacteriological samples shall be taken in accordance with AWWA C651. Submit water samples in appropriate bottles to authorities having jurisdiction.
2. Disinfection, flushing, and bacteriological processes shall be repeated until all new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired all pass bacteriological testing in accordance with PA DEP requirements.
3. Prepare reports of purging and disinfecting activities.

B. Hydrostatic Testing of Buried Water Mains: Testing shall be in accordance with AWWA C600, Section 4, Hydrostatic Testing. Before the pipe is tested, concrete thrust blocks shall be in place and backfilling shall be completed. When the entire pipeline, or a designated portion thereof, is completed, it shall be tested hydraulically as follows:

1. The pipeline or designated portion thereof shall be filled by the Contractor with water from source of supply made available by the Authority, and shall be vented free from air or air pockets.
2. After the system has been full of water for 24 hours, the hydrostatic pressure shall be brought to 150 lbs/sq. in. minimum and maintained for a period of 2 hours, or as directed by the Engineer. Test pressure shall not vary by more than +/-5 psi for the duration of the test.
3. During the 2-hour period when the system is under the test pressure, no section of pipe of uniform diameter shall show a leakage in excess of 11.65 gallons per day per mile per inch of diameter. Allowable leakage is based on the following formula:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during the leakage test, in pounds per square inch (gauge)

Any leaks shall be repaired in a satisfactory manner by the Contractor, at his own expense. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the specified test pressure after the pipe has been filled with water and the air has been expelled. Leakage shall not be measured by a drop in pressure in a test section over a period of time.

4. The entire cost of testing the system shall be borne by the Contractor and shall be included in the cost of the work for which payment is made. After the pipe is tested and accepted by the Engineer, the remainder of the trench shall be backfilled in accordance with Section 312000 "Earth Moving".
5. Water service connections shall be tested and checked for visual leakage under normal system operating pressure, after installation and prior to backfilling.
6. All connections to existing piping shall be tested and checked for visual leakage under normal system operating pressure, after connections are completed and prior to backfilling, as specified herein.

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7. A 1 inch diameter corporation stop shall be supplied and installed by the Contractor for the purpose of pressurizing the new main. The corporation stop for testing shall be installed at the point of highest elevation in the section of the new main to be hydrostatically tested. Upon completion of the test, the corporation stop shall be removed, and a threaded brass plug shall be installed by the Contractor.

3.4 FAILED ACCEPTANCE TEST

- A. If any test results indicate the presence of a defect, whether caused by defective materials, improper workmanship or damage to the materials, the Contractor shall, locate and repair the defect at his own expense.
- B. The means and methods of repair shall be discussed with the Engineer prior to execution.
- C. If defective portions cannot be located, remove and reconstruct as much of the original work as necessary to obtain piping that meets the leakage requirements specified herein and retest, all at no addition to the Contract Price.
- D. The failed test shall be re-performed until the results are within acceptable limits.

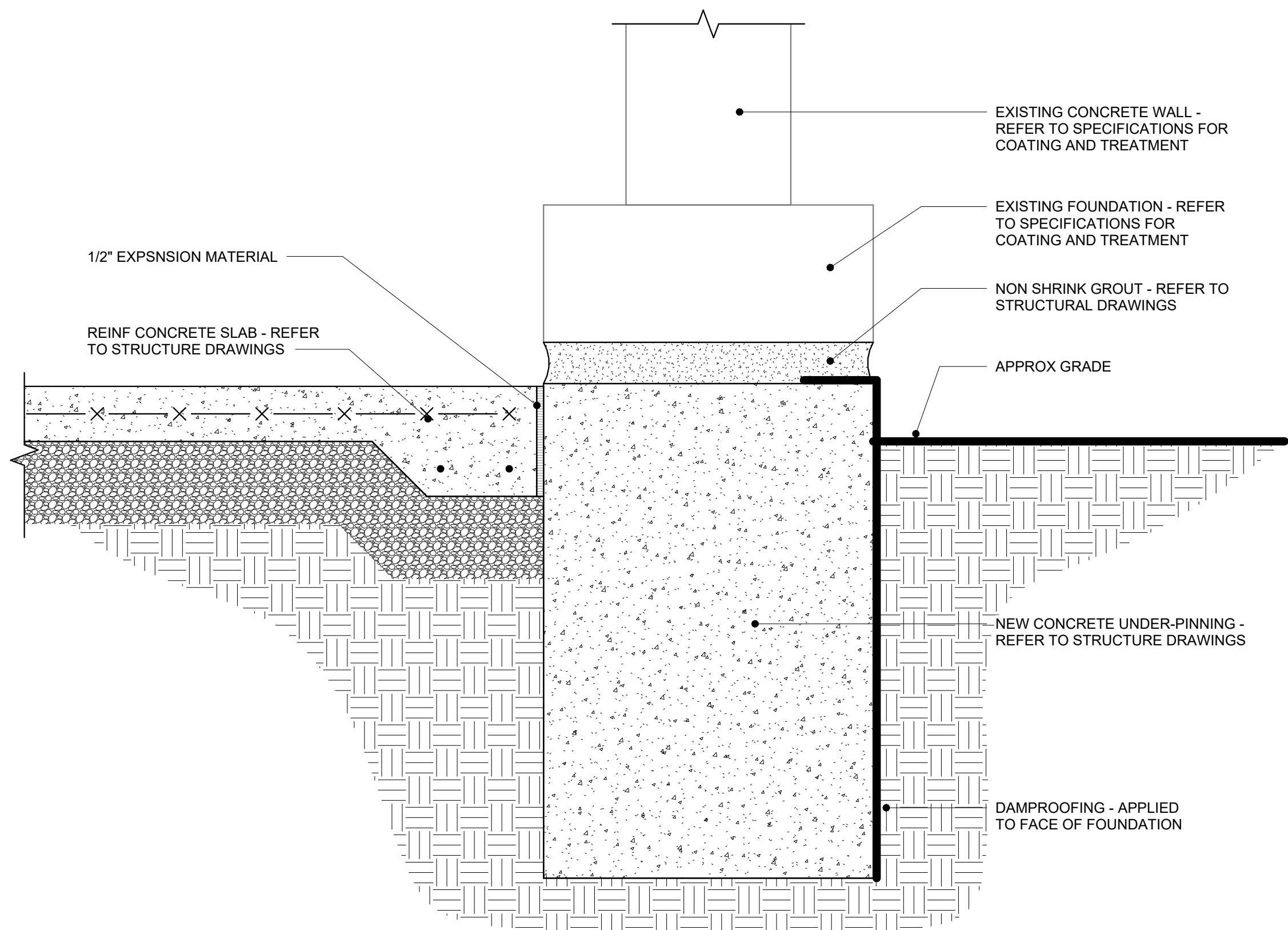
END OF SECTION 33 30 01

1. CLEAN 100% OF FACADES INCLUDING BUT NOT LIMITED TO CONCRETE, BRICK MASONRY, CONCRETE MASONRY UNITS, & STEEL
2. EXISTING BRICK TO BE DEMOLISHED TO BE SALVAGED AND REUSED FOR BRICK REPLACEMENT IN OTHER AREAS WHERE BRICK REPLACEMENT IS REQUIRED.
3. CLEAN AND COAT 100% OF EXPOSED STEEL INCLUDING ALL LINTELS AT MASONRY OPENINGS, WF COLUMNS, WF FRAMING, COLUMN BASE PLATES, & EMBEDDED STEEL IN BRICK MASONRY WALLS. EXPOSE STEEL EMBEDDED IN MASONRY WALL AS REQUIRED.
4. REMOVE AND REINSTALL FACADE MOUNTED SIGNS AND EQUIPMENT AS REQUIRED TO COMPLETE WORK.
5. ALL COLOR SELECTIONS BY ARCHITECT / OWNER
6. PROVIDE ALL MOCK-UPS AS REQUIRED FOR ARCHITECT / OWNER REVIEW PRIOR TO WORK.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CAULKING, SEALING, PAINTING AND FLASHING AS REQUIRED FOR WATERTIGHT JOB.
8. THE ELECTRICAL CONTRACTOR IS TO FIELD VERIFY ALL EXTERIOR LIGHTING AND SPEAKER LOCATIONS W/ THE ARCHITECT / OWNER PRIOR TO INSTALLATION
9. REFER TO MASONRY RESTORATION SPEC SECTION. ALL REPAIR LOCATIONS ARE TO BE CONFIRMED W/ OWNER AND ARCHITECT PRIOR TO WORK.
10. REFER TO ELECTRICAL DRAWINGS & MECHANICAL DRAWINGS FOR ALL ITEMS, DEVICES AND CONDUIT RUNS BEING REMOVED. THE GC SHALL PATCH REPAIR ALL MASONRY AFFECTED BY THIS DEMOLITION SCOPE.
11. ALL BRICK VENEER IN-FILL LOCATIONS TO BE TOOTHED-IN TO MATCH EXISTING ADJACENT AND TO CREATE A SMOOTH/FLUSH TRANSITION. GC TO IN-FILL WALL CAVITY WITH CMU TO MATCH EXISTING ADJACENT AND TO CREATE A SMOOTH/FLUSH INTERIOR WALL CONDITION.

- A: REPOINT MORTAR JOINTS IN BRICK / CMU
- B: REMOVE AND REPLACE DAMAGED / CRACKED BRICK, REPOINT MORTAR JOINTS AS REQ'D
- C: CLEAN AND COAT LINTELS @ DOORS AND WINDOWS (TYP.)
- D: REPAIR CONCRETE SPALLING
- E: FILL / REPAIR CRACKS IN EXISTING STUCCO. PROVIDE FACADE COATING ON STUCCO - REFER TO SPECS.
- F: REMOVE ANCHOR / INFILL HOLE



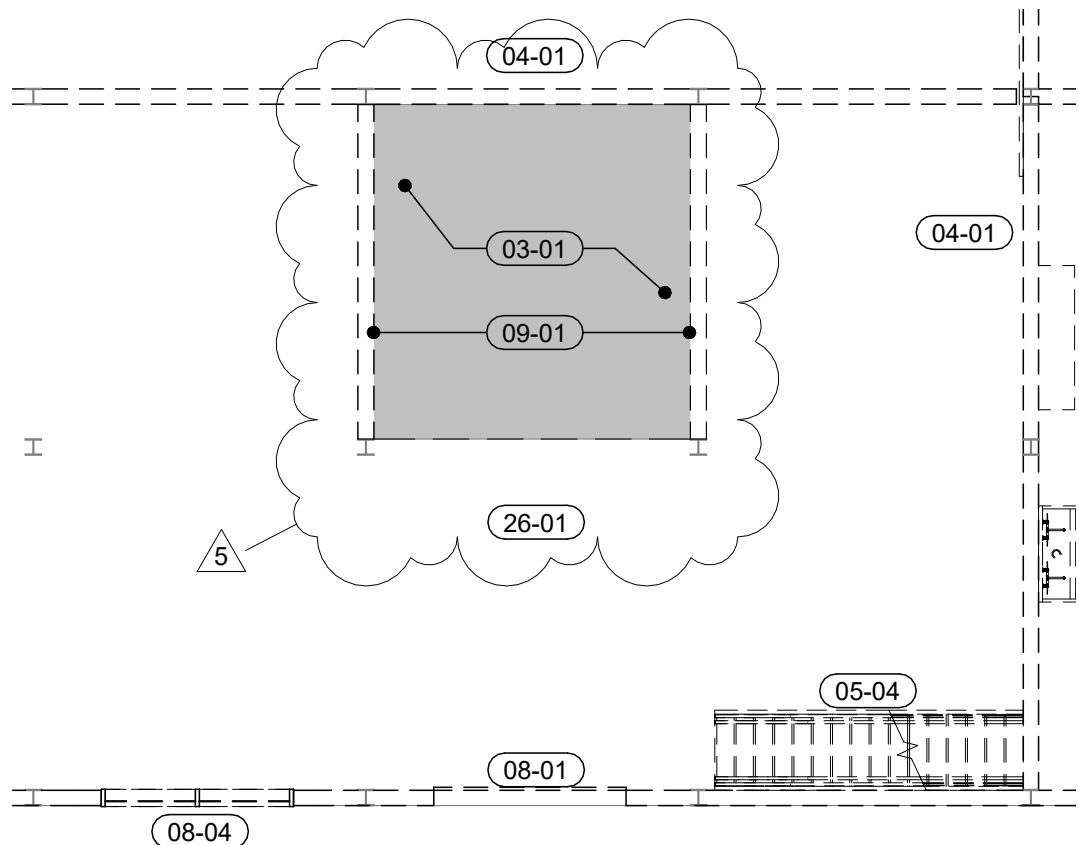
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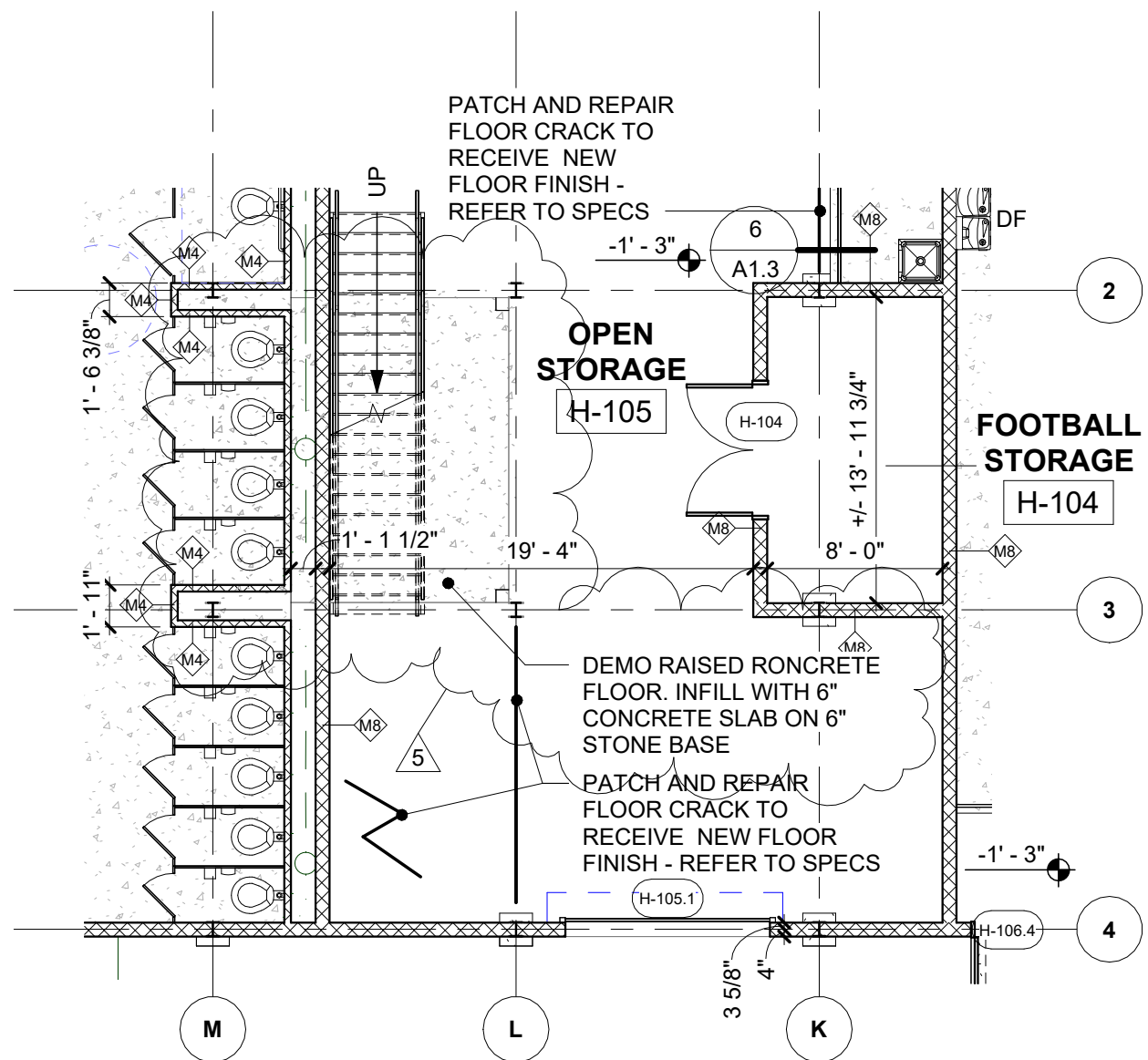
1 SECTION DETAIL

ASK-06 1 1/2" = 1'-0"

SKETCH SHEET REFERENCE DWG. NUMBER: ADD AS DETAIL 8/A1.3



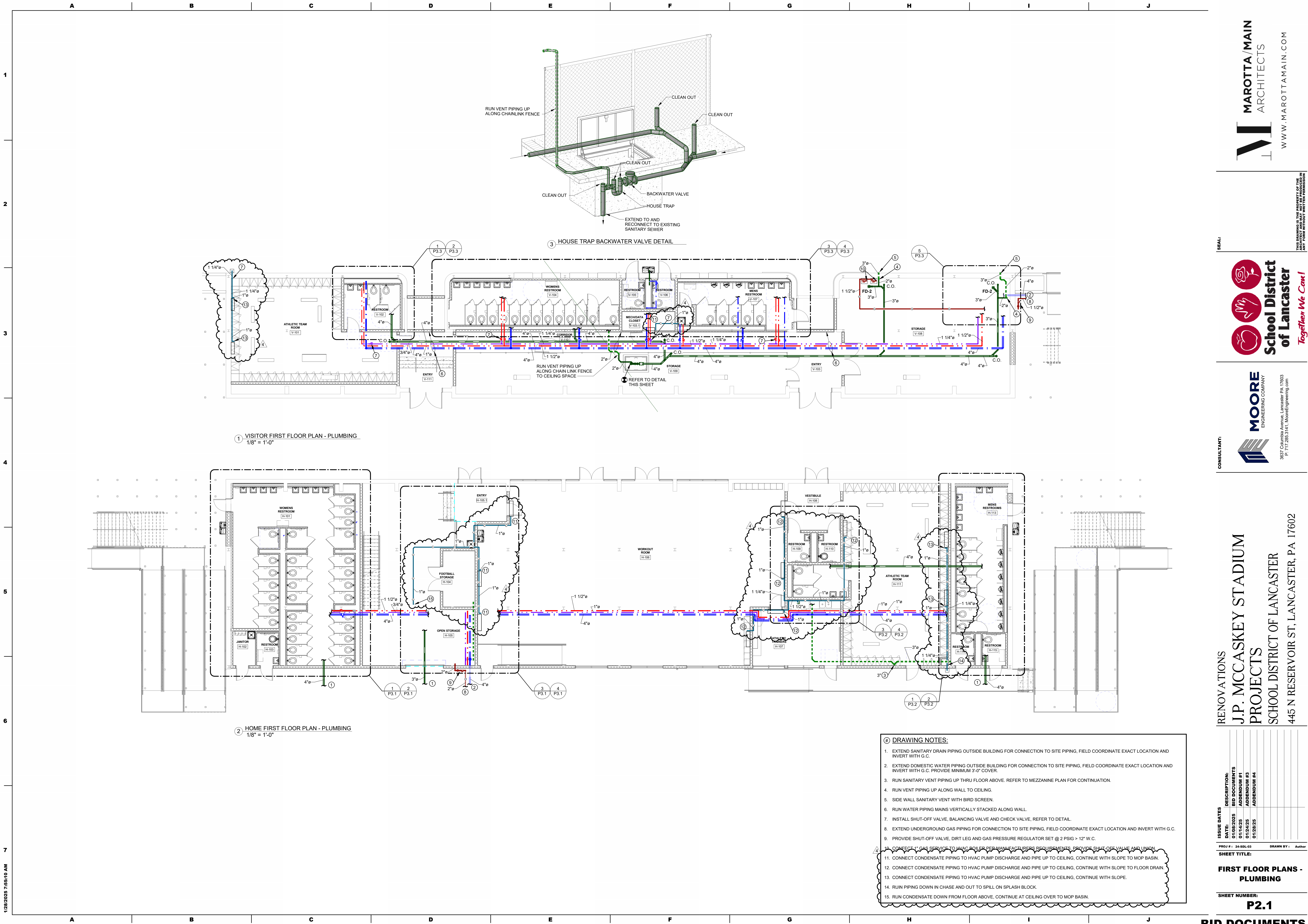
1 HOME FIRST FLOOR DEMOLITION PLAN
ASK-07 1/8" = 1'-0" REFERENCE TO 2/AD1.2



2 HOME FIRST FLOOR PLAN
ASK-07 1/8" = 1'-0" REFERENCE TO 2/A1.2

SKETCH SHEET REFERENCE DWG. NUMBER:

1/28/2025 7:55:10 AM



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CONSULTANT:

MOORE
ENGINEERING COMPANY
3637 Columbia Avenue, Lancaster, PA 17603
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RENOVATIONS
J.P. MCCASKEY STADIUM
PROJECTS
SCHOOL DISTRICT OF LANCASTER
445 N RESERVOIR ST, LANCASTER, PA 17602

ISSUE DATES	DESCRIPTION:
DATE:	BID DOCUMENTS
01/05/2025	ADDENDUM #1
01/14/25	ADDENDUM #3
01/24/25	ADDENDUM #4
01/28/25	

PROJ # : 24-SOL-03 DRAWN BY : Author

SHEET TITLE:

FIRST FLOOR PLANS - PLUMBING

SHEET NUMBER:

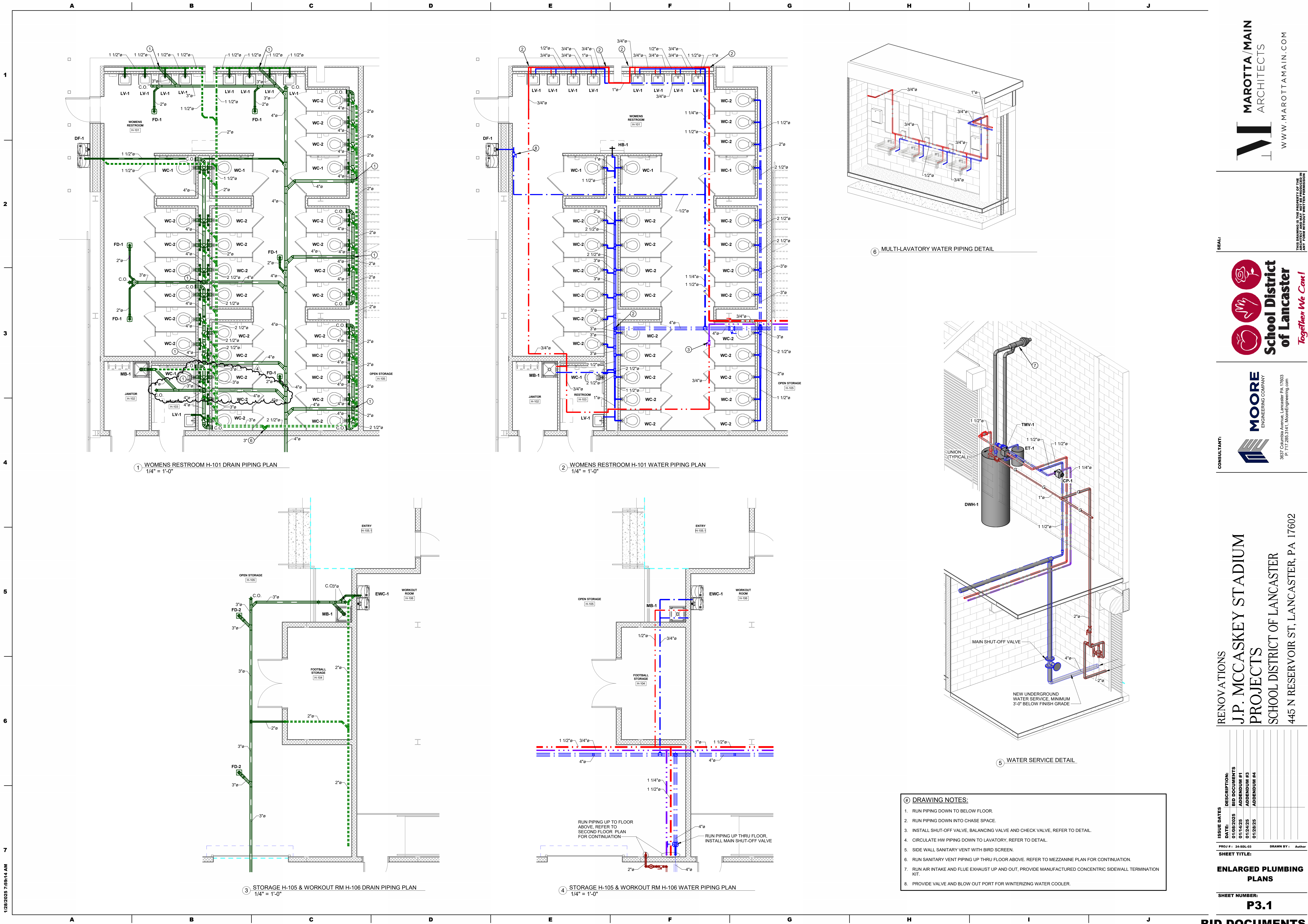
P2.1

BID DOCUMENTS

SECOND FLOOR PLAN - PLUMBING



- ⑨ DRAWING NOTES:**
1. RUN SANITARY VENT PIPING UP FLOOR BELOW ALONG WALL AND TERMINATE OUTSIDE BUILDING - SIDE WALL VENT WITH BIRD SCREEN.
 2. RUN WATER PIPING MAINS UP FROM FLOOR BELOW.
 3. INSTALL WATER HEATER PER MANUFACTURERS REQUIREMENTS, PROVIDE 4" THICK HOUSE KEEPING PAD, PAD SHALL EXTEND 4" OUT ON ALL SIDES.
 4. RUN AIR INTAKE AND FLUE EXHAUST UP AND OUT, PROVIDE MANUFACTURED CONCENTRIC SIDEWALL TERMINATION KIT.
 5. RUN GAS AND WATER PIPING MAINS UP FROM FLOOR BELOW.
 6. CONFECT GAS SERVICE TO WATER HEATER PER MANUFACTURERS REQUIREMENTS. PROVIDE SHUT-OFF VALVE AND UNION.
 7. CONFECT 1" GAS SERVICE TO HVAC BOILER PER MANUFACTURERS REQUIREMENTS. PROVIDE SHUT-OFF VALVE AND UNION.
 8. CONNECT CONDENSATE PIPING TO HVAC PUMP DISCHARGE AND PIPE UP TO CEILING, CONTINUE WITH SLOPE.
 9. RUN PIPING DOWN THRU FLOOR TO CEILING SPACE OF FLOOR BELOW, REFER TO DRAWING P2.1 FOR CONTINUATION.



1

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RENOVATIONS

J.P. MCCASKEY STADIUM

PROJECTS

SCHOOL DISTRICT OF LANCASTER

445 N RESERVOIR ST, LANCASTER, PA 17602

5

ISSUE DATES

DATE: 01/05/2025

DESCRIPTION: BID DOCUMENTS

DATE: 01/14/25

ADDENDUM #1

DATE: 01/24/25

ADDENDUM #3

DATE: 01/28/25

ADDENDUM #4

6

PROJ #1: 24-SOL-03

DRAWN BY: Author

SHEET TITLE:

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ENLARGED PLUMBING PLANS

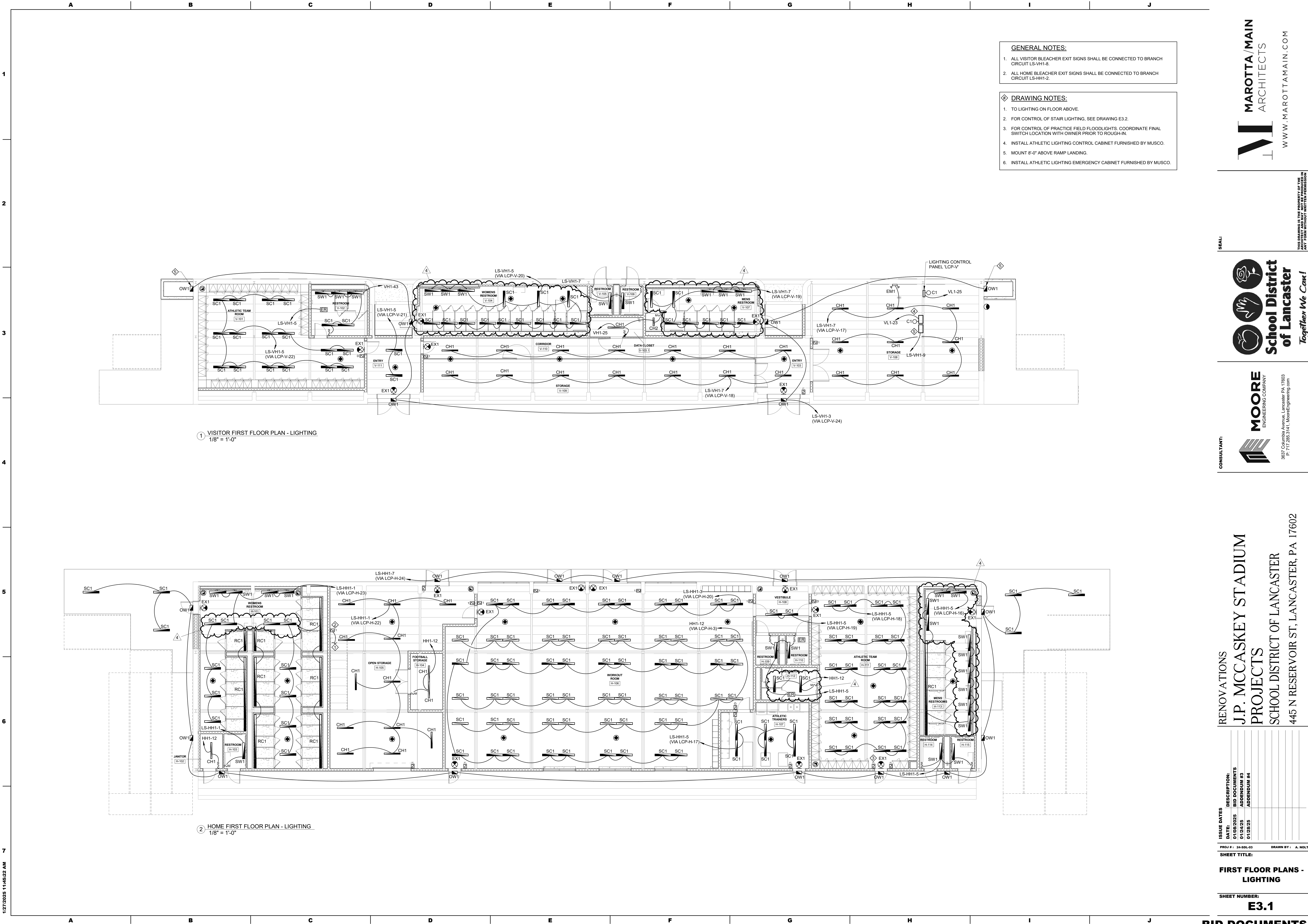
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BID DOCUMENTS

- ⑥ DRAWING NOTES:**
1. RUN PIPING DOWN TO BELOW FLOOR.
 2. RUN PIPING DOWN INTO CHASE SPACE.
 3. INSTALL SHUT-OFF VALVE, BALANCING VALVE AND CHECK VALVE, REFER TO DETAIL.
 4. CIRCULATE HW PIPING DOWN TO LAVATORY, REFER TO DETAIL.
 5. SIDE WALL SANITARY VENT WITH BIRD SCREEN.
 6. RUN SANITARY VENT PIPING THRU FLOOR ABOVE. REFER TO MEZZANINE PLAN FOR CONTINUATION.
 7. RUN AIR INTAKE AND FLUE EXHAUST UP AND OUT, PROVIDE MANUFACTURED CONCENTRIC SIDEWALL TERMINATION KIT.
 8. PROVIDE VALVE AND BLOW OUT PORT FOR WINTERIZING WATER COOLER.



- GENERAL NOTES:**
1. ALL VISITOR BLEACHER EXIT SIGNS SHALL BE CONNECTED TO BRANCH CIRCUIT LS-VH1-8.
 2. ALL HOME BLEACHER EXIT SIGNS SHALL BE CONNECTED TO BRANCH CIRCUIT LS-HH1-2.
- DRAWING NOTES:**
1. TO LIGHTING ON FLOOR ABOVE.
 2. FOR CONTROL OF STAIR LIGHTING, SEE DRAWING E3.2.
 3. FOR CONTROL OF PRACTICE FIELD FLOODLIGHTS, COORDINATE FINAL SWITCH LOCATION WITH OWNER PRIOR TO ROUGH-IN.
 4. INSTALL ATHLETIC LIGHTING CONTROL CABINET FURNISHED BY MUSCO.
 5. MOUNT 8'-0" ABOVE RAMP LANDING.
 6. INSTALL ATHLETIC LIGHTING EMERGENCY CABINET FURNISHED BY MUSCO.

1 VISITOR FIRST FLOOR PLAN - LIGHTING
1/8" = 1'-0"

2 HOME FIRST FLOOR PLAN - LIGHTING
1/8" = 1'-0"

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RENOVATIONS
J.P. MCCASKEY STADIUM
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SCHOOL DISTRICT OF LANCASTER
445 N RESERVOIR ST, LANCASTER, PA 17602

ISSUE DATES	DESCRIPTION
DATE: 01/05/2025	BID DOCUMENTS
01/24/25	ADDENDUM #3
01/28/25	ADDENDUM #4

PROJ #1: 24-SOL-03
DRAWN BY: A. NOLT
SHEET TITLE:
FIRST FLOOR PLANS - LIGHTING
SHEET NUMBER:
E3.1

BID DOCUMENTS



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PROJ #: 24-SDL-03 DRAWN BY: A. NOLT

SHEET TITLE:

SHEET NUMBER:

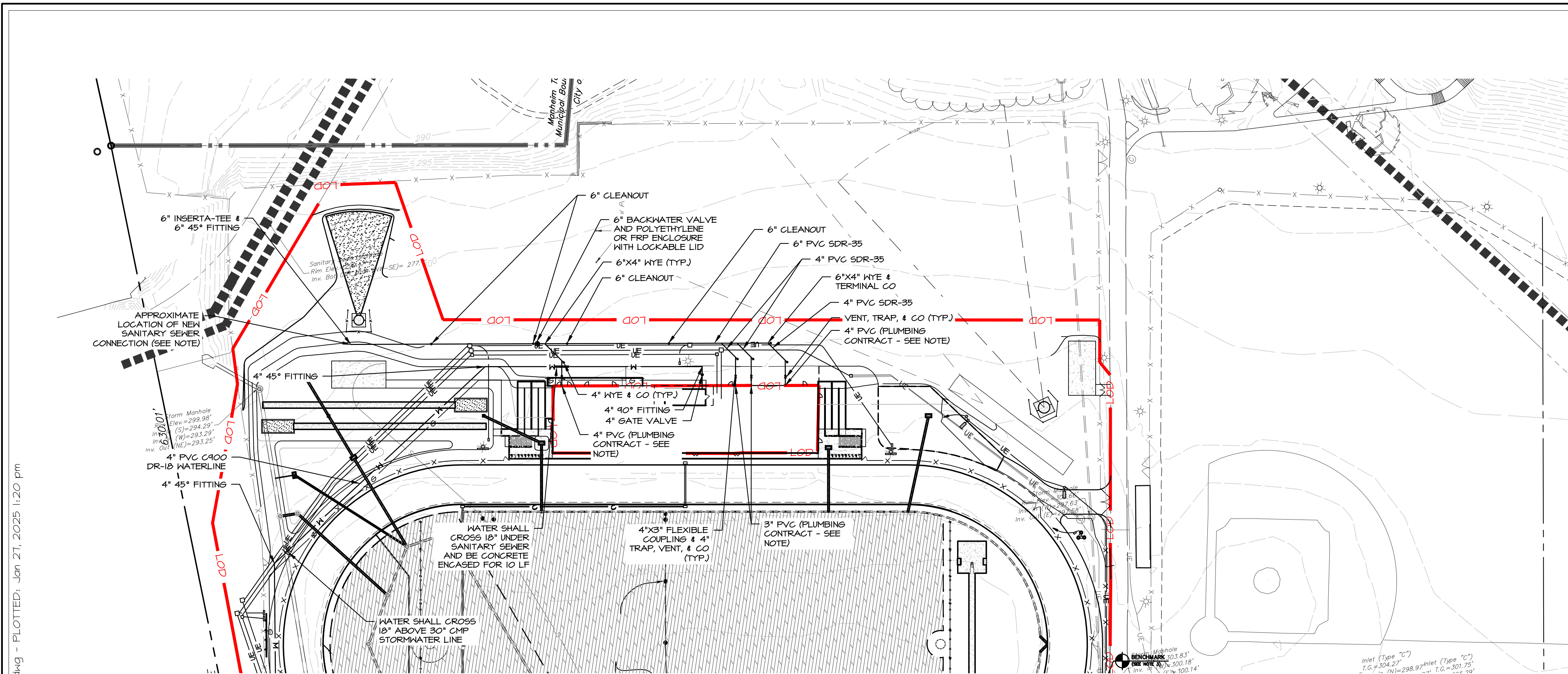
D DOCUMENTS

1. ACCESS CONTROL PANEL AND DOOR HARDWARE POWER SUPPLIES.
2. PROVIDE DOOR CONTACT TYPE FOR OVERHEAD DOOR USE.
3. FOR OVERHEAD DOOR OPERATION, COORDINATE WITH GC FOR ACCESS CONTROL INTEGRATION WITH OVERHEAD DOOR CONTROLLER.
4. COORDINATE FINAL LOCATION WITH FIRE MARSHAL PRIOR TO ROUGH-IN.
5. COORDINATE FINAL LOCATION WITH OWNER PRIOR TO ROUGH-IN.



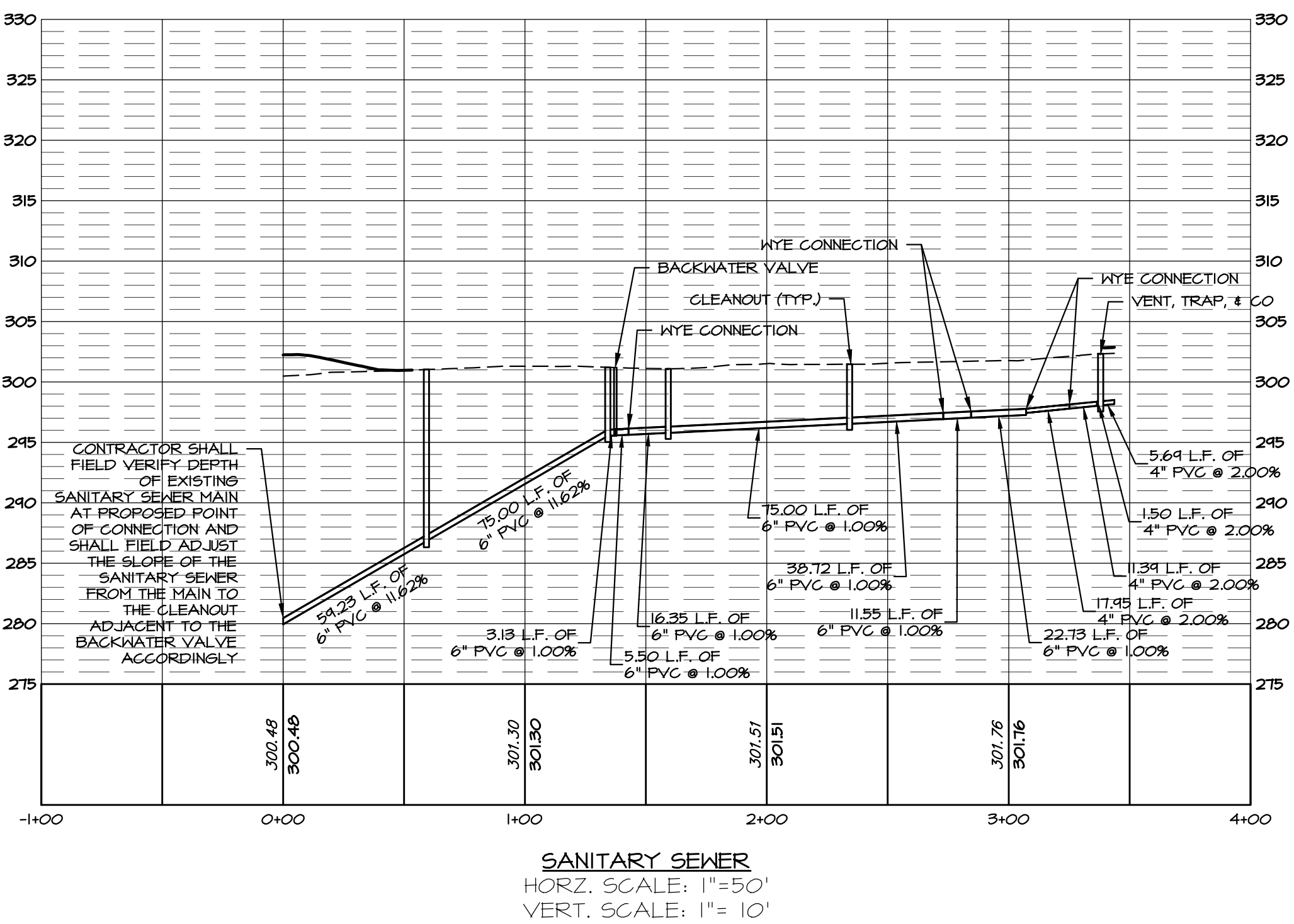
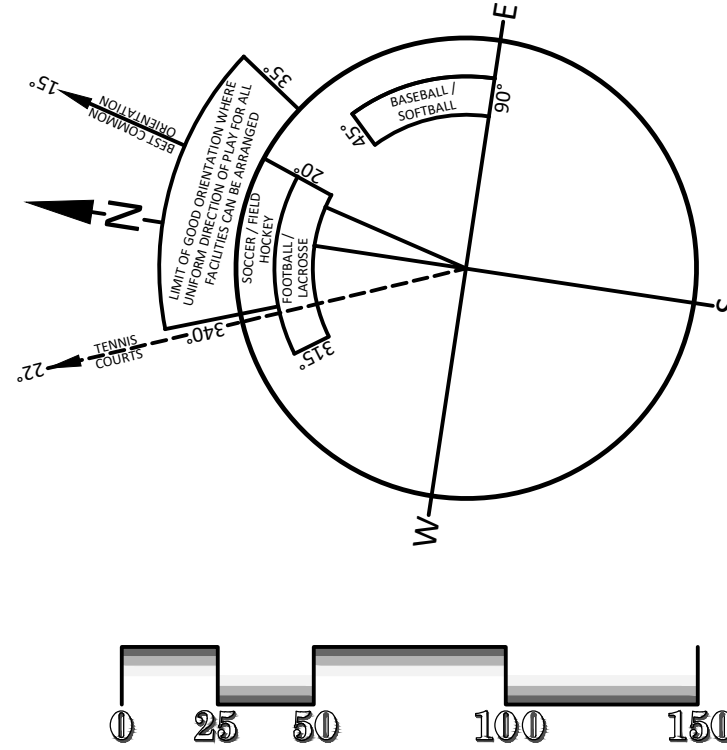
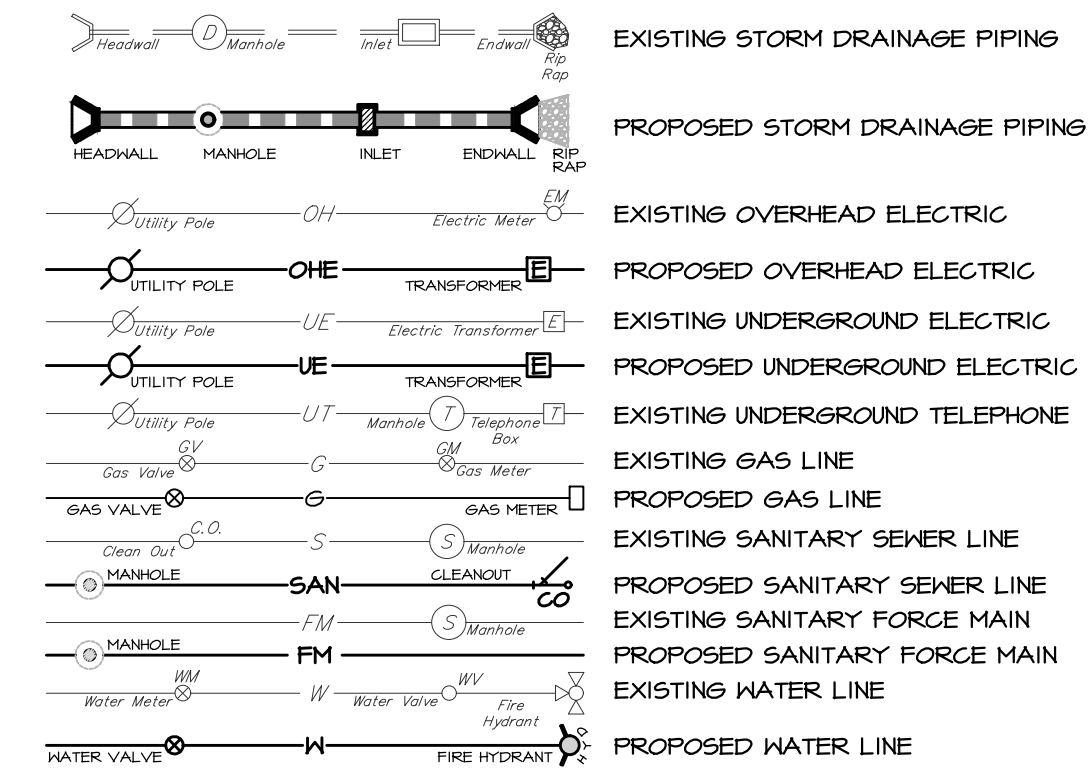
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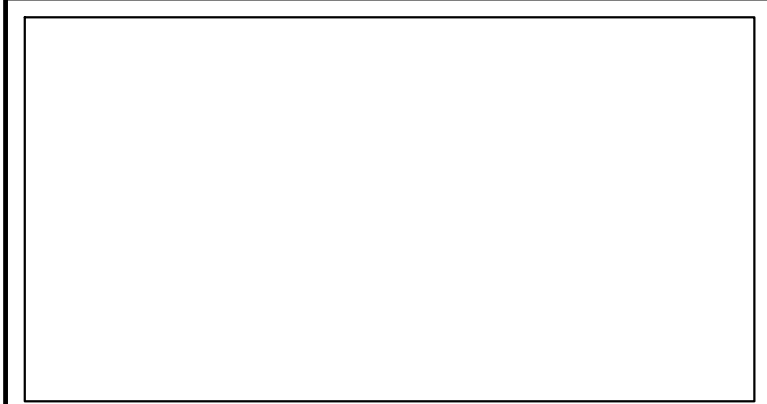
- NOTES:
1. NO EQUIPMENT STORAGE, MATERIAL STOCKPILING, OR VIBRATORY ROLLINGS/COMPACTION WITHIN THE CITY'S SEWER EASEMENT(S).
 2. LIMIT OF THE PLUMBING CONTRACT IS WITHIN 5' OF THE BUILDING ENVELOPES. CONTRACTOR RESPONSIBLE FOR SITE WORK SHALL BE RESPONSIBLE FOR WATER AND SANITARY SEWER DEPICTED ON THE PLAN STARTING AT 5' BEYOND THE BUILDING ENVELOPES.
 3. CONTRACTOR SHALL FIELD VERIFY DEPTH OF EXISTING SANITARY SEWER MAIN AT PROPOSED POINT OF CONNECTION AND SHALL FIELD ADJUST THE SLOPE OF THE SANITARY SEWER FROM THE MAIN TO THE CLEANOUT ADJACENT TO THE BACKWATER VALVE ACCORDINGLY.

UTILITY LEGEND



REVISIONS PER:	DATE:	BY:
1. -	-	-
2. -	-	-
3. -	-	-
4. -	-	-
5. -	-	-

743 SOUTH BROAD STREET
LITITZ, PA 17543
(717) 626-7271 FAX (717) 626-7040
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CONSTRUCTION DOCUMENTS

SUBJECT: **SANITARY SEWER PLAN & PROFILE**

FOR
McCASKEY HIGH SCHOOL STADIUM RENOVATIONS
CITY OF LANCASTER - LANCASTER COUNTY - PENNSYLVANIA

CLIENT:
MM ARCHITECTS
214 NORTH DUKE STREET
LANCASTER, PA 17602
(717) 393-3211

MANAGER:	HDC	DATE:	JAN. 29, 2025
ENGINEER:	TWD	PROJECT NO.	AZ202-015
DRAWN BY:	TMO	SCALE:	1" = 50'

DRAWING NO.
CSK-05

RENOVATIONS
J.P. MCCASKEY STADIUM
PROJECTS
SCHOOL DISTRICT OF LANCASTER
445 N RESERVOIR ST, LANCASTER, PA 17602

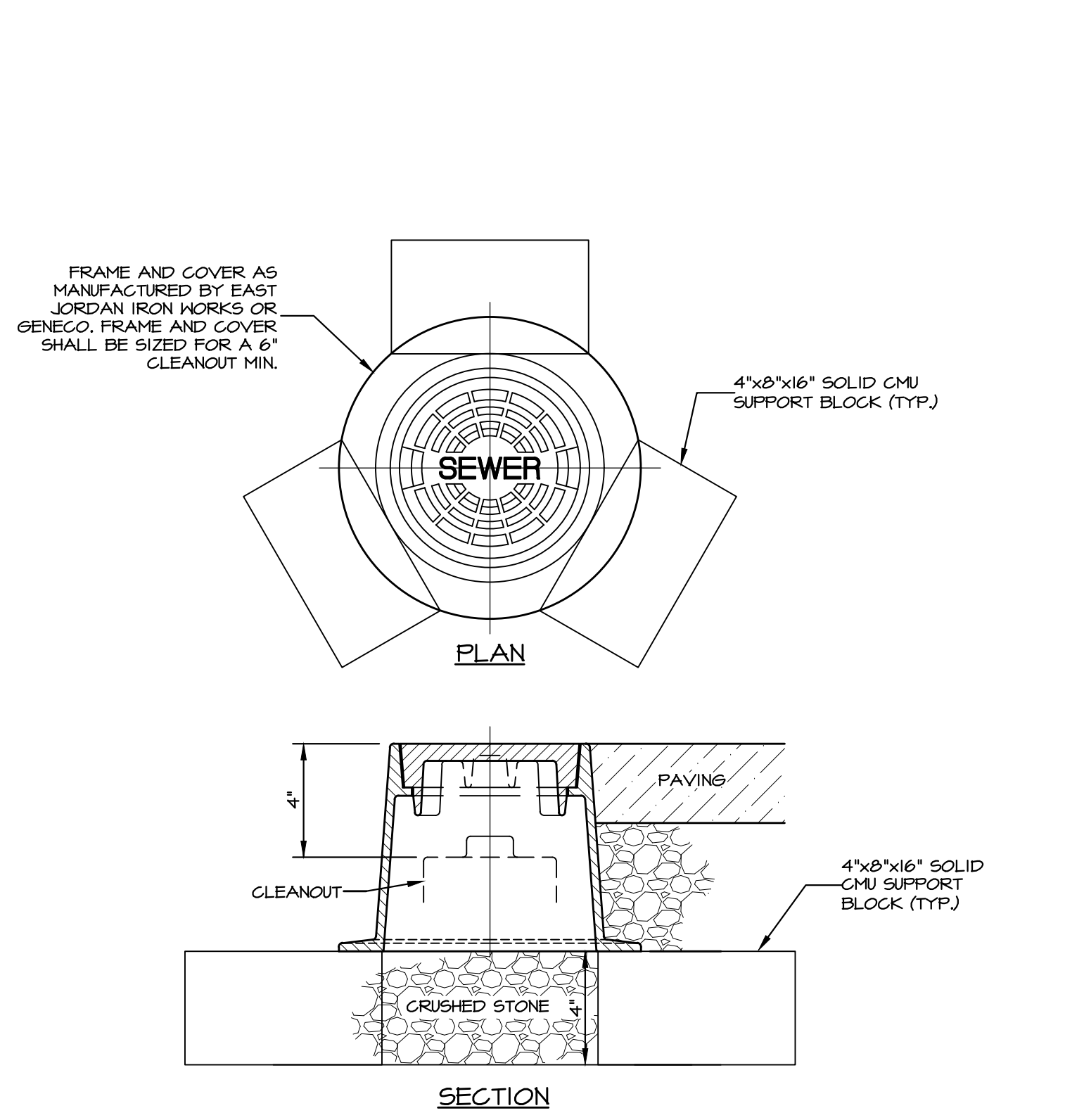
ISSUE DATES
DATE: 01/17/2025
DESCRIPTION: ADDENDUM 2
01/29/2025
ADDENDUM 4

PROJ # : 24-505-03
DRAWN BY: ELA/HDC/ELS
SHEET TITLE:
**SANITARY SEWER
PLAN & PROFILE**
SHEET NUMBER:
CSK-05
ADDENDUM 04

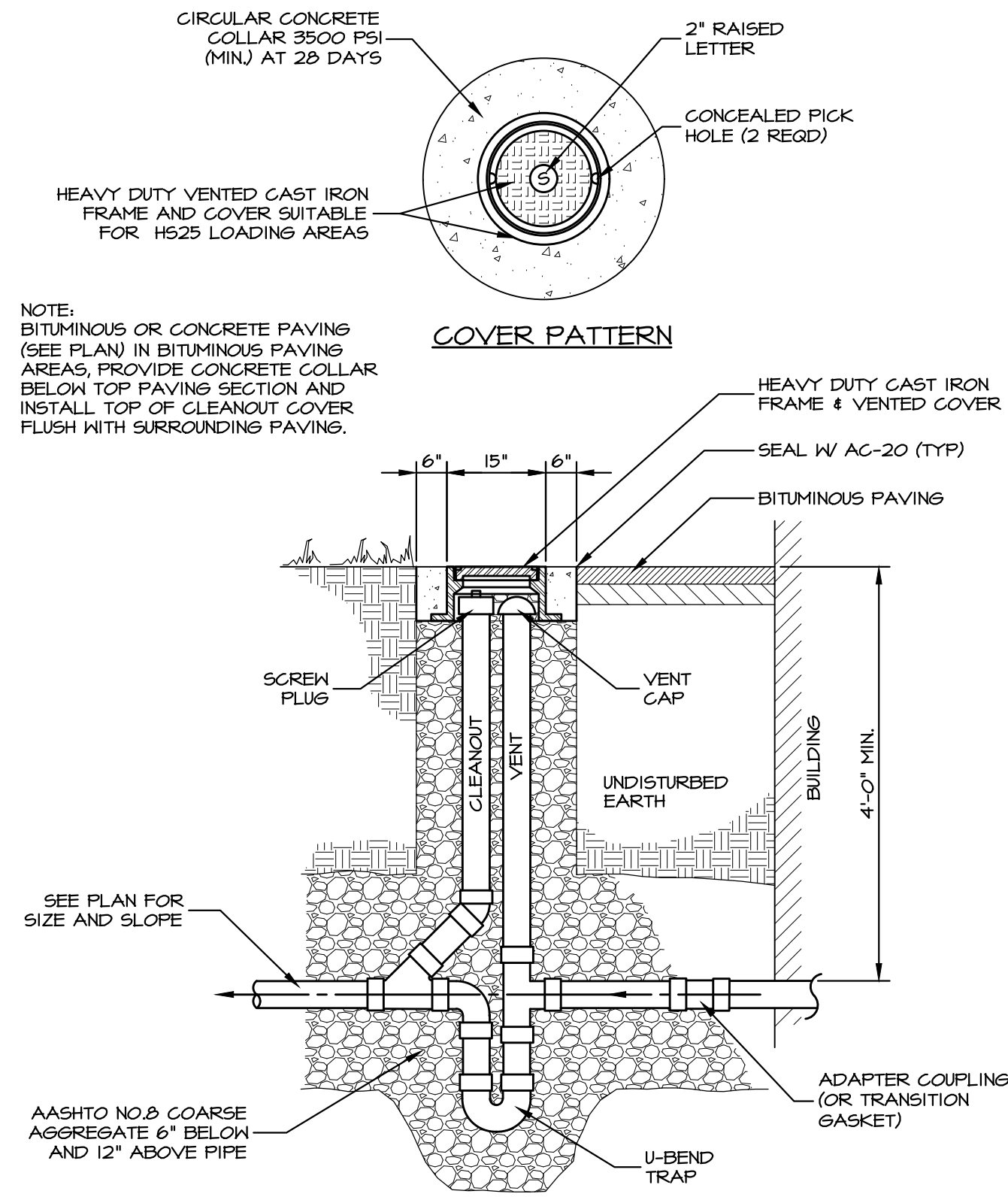
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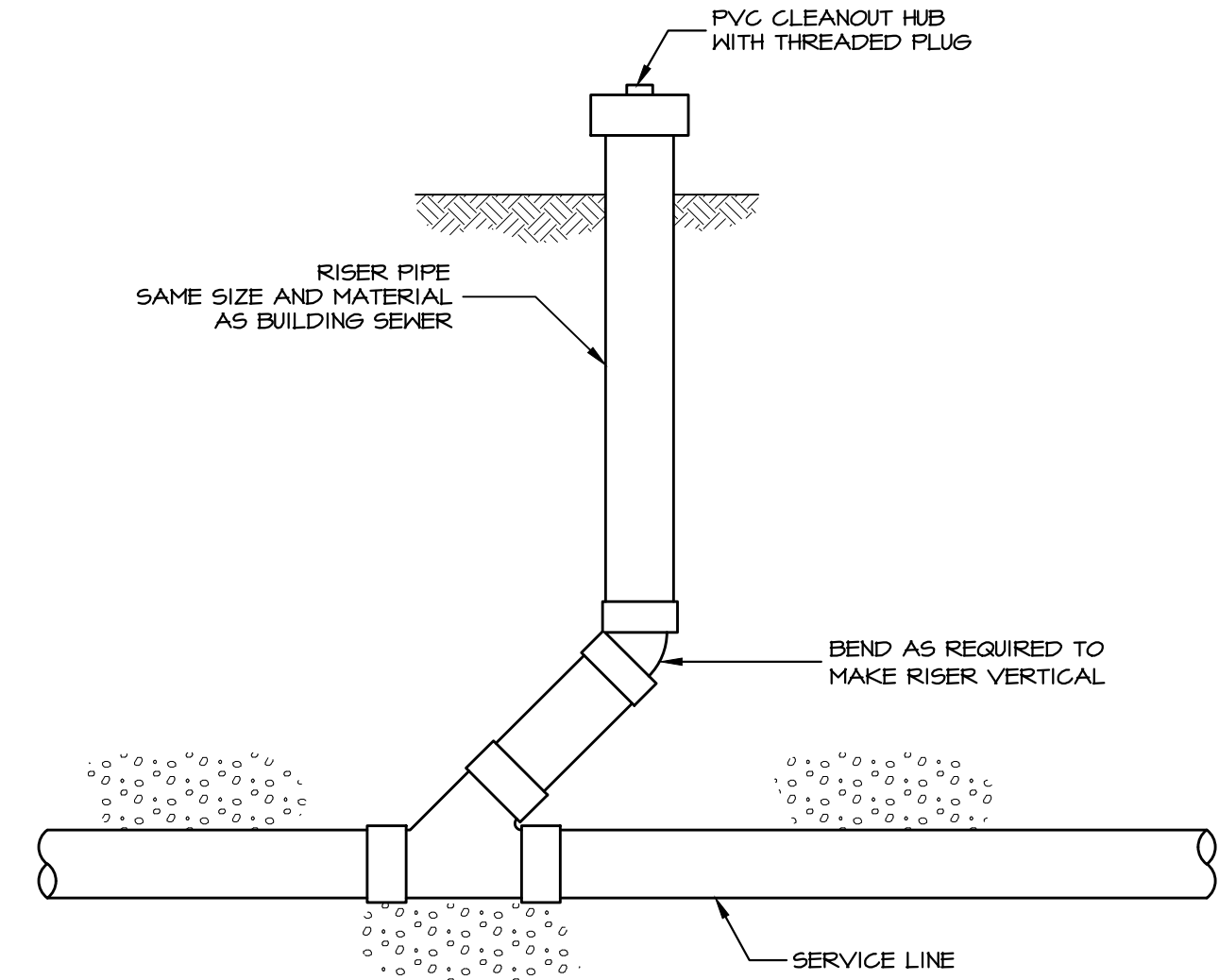
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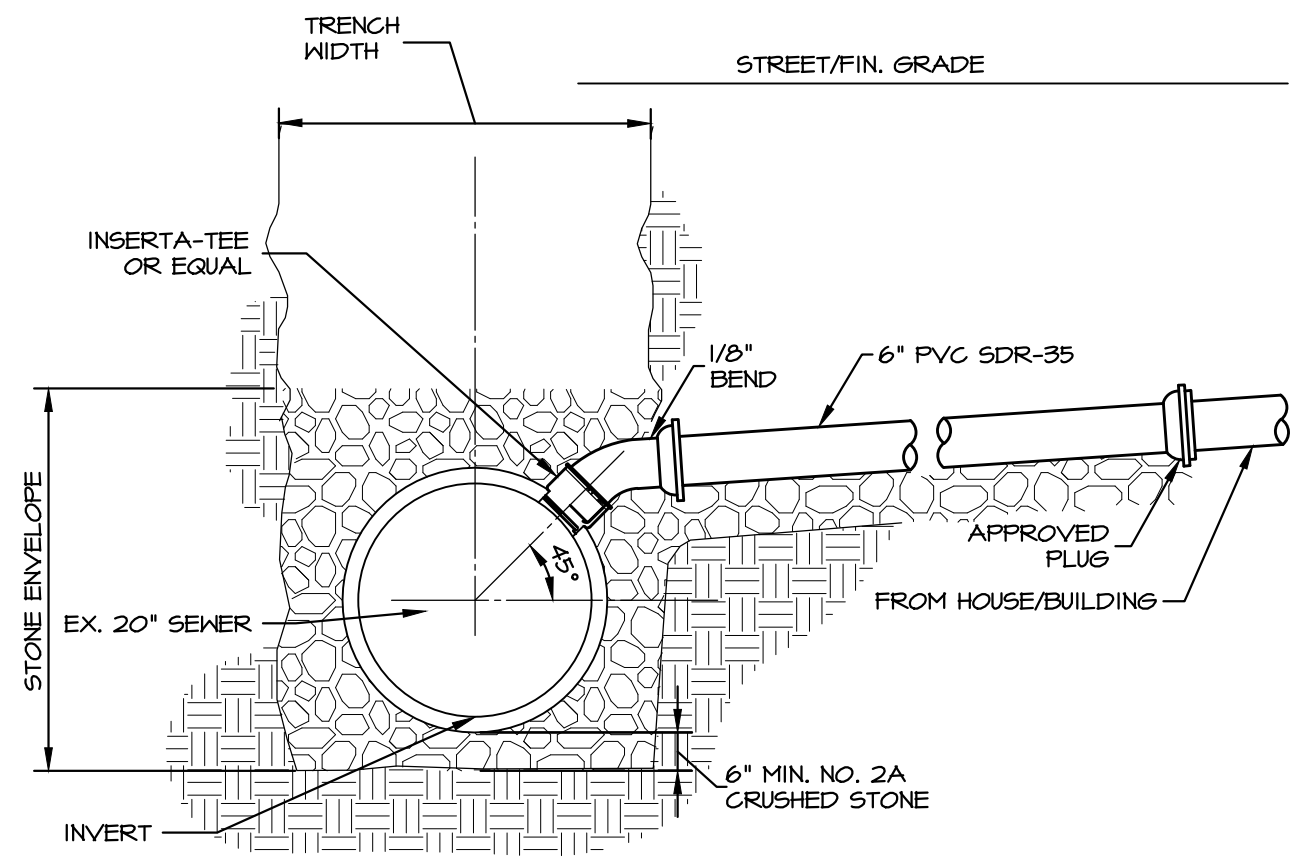
A CLEANOUT FRAME AND COVER IN PAVED AREA
NO SCALE SAN-206



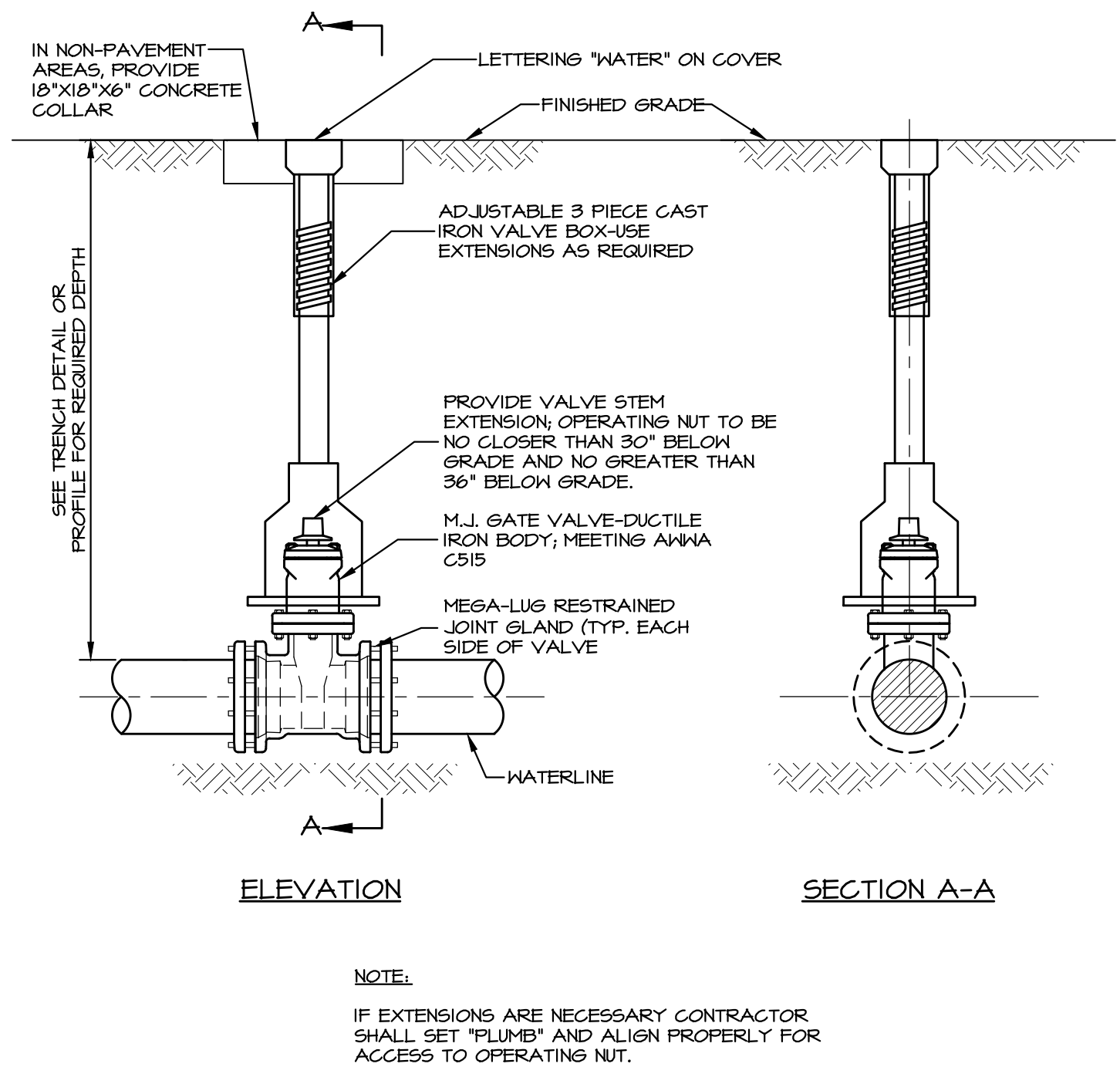
B TRAP AND VENT DETAIL
NO SCALE SAN-207



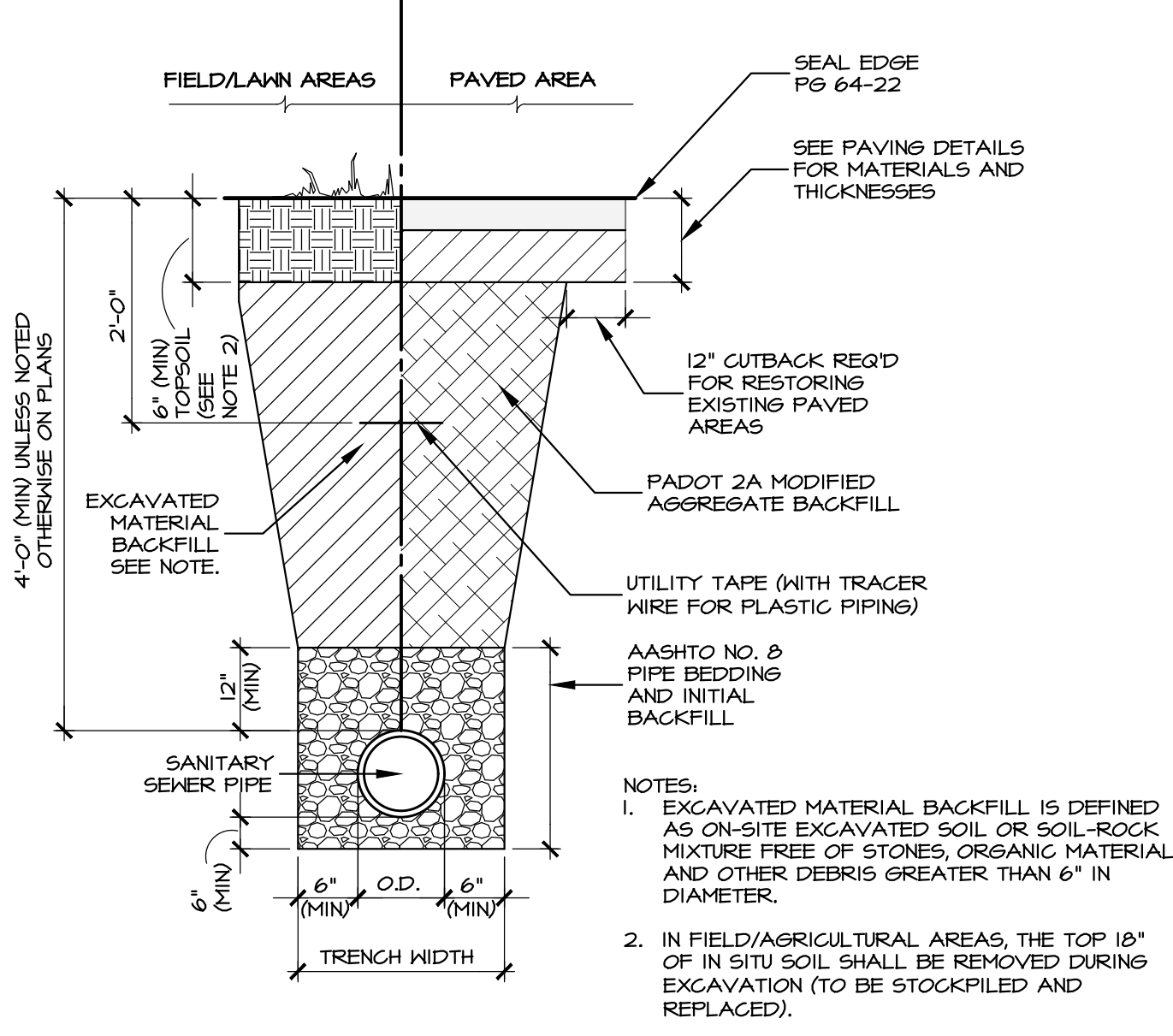
C NEW CLEANOUT IN LAWN AREAS
NO SCALE SAN-202



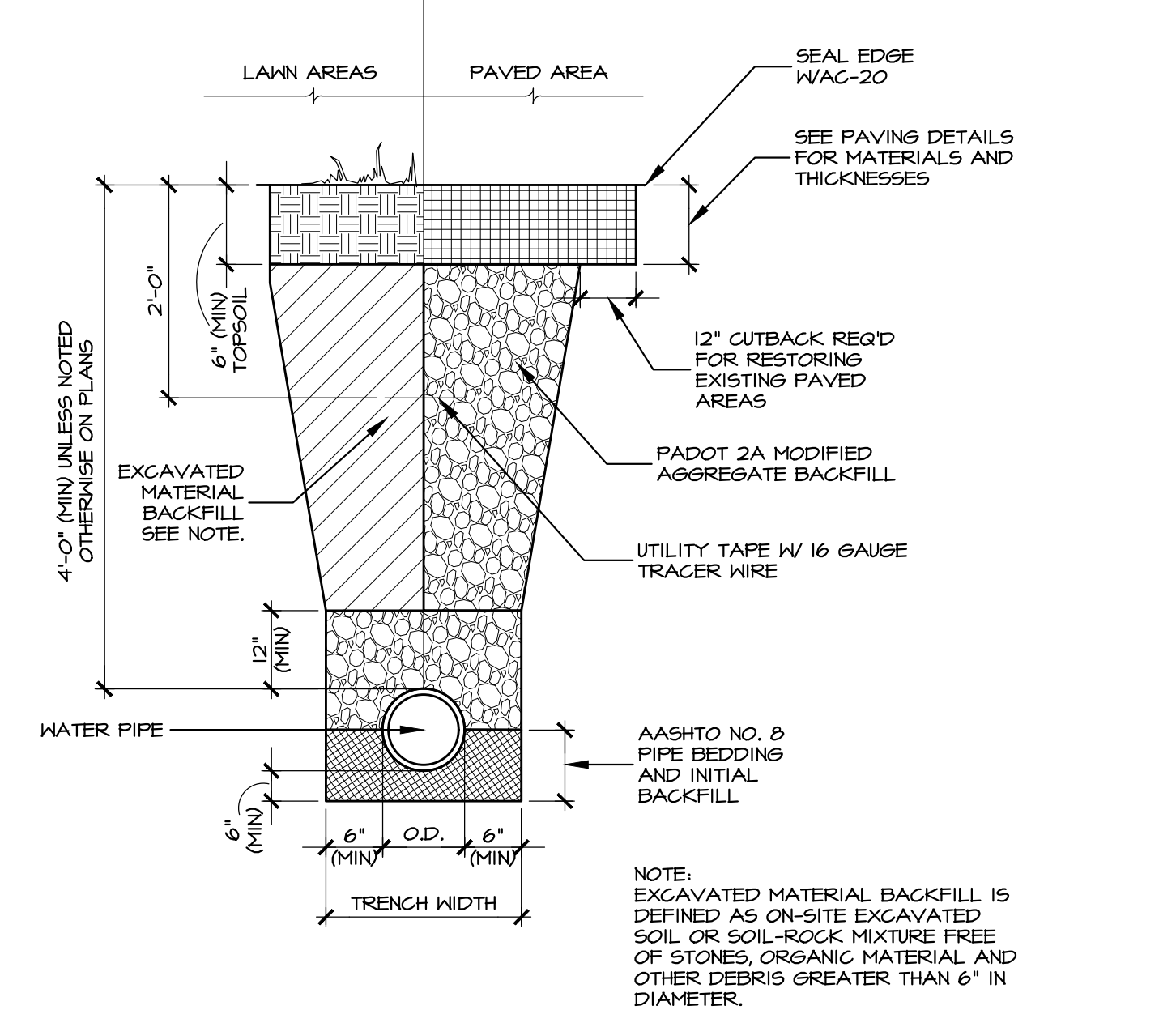
D STANDARD LATERAL CONNECTION
NO SCALE SAN-900



E GATE VALVE AND VALVE BOX
NO SCALE VAL-101




F GRAVITY SANITARY SEWER PIPE INSTALLATION
NO SCALE CVN-214



G WATER PIPE INSTALLATION
NO SCALE CVN-215

REVISIONS PER:	DATE:	BY:
1.		
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CONSTRUCTION DOCUMENTS

SUBJECT:

UTILITY DETAILS

FOR

McCASKEY HIGH SCHOOL STADIUM RENOVATIONS
CITY OF LANCASTER - LANCASTER COUNTY - PENNSYLVANIA

CLIENT:

MM ARCHITECTS
214 NORTH DUKE STREET
LANCASTER, PA 17602
(717) 393-3211

MANAGER:	HDC	DATE:	JAN. 29, 2025
ENGINEER:	EWB	PROJECT NO.	AZ202-015
DRAWN BY:	TMO	SCALE:	AS NOTED

DRAWING NO.
CSK-06

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PROJ # : 24-SBL-03

SHEET TITLE:

UTILITY DETAILS

SHEET NUMBER:

CSK-06

ADDENDUM 04

CONSULTANT:

ELASport

ATHLETIC FACILITIES DESIGN & CONSULTING

REVISIONS

J.P. MCCASKEY STADIUM

PROJECTS

SCHOOL DISTRICT OF LANCASTER

445 N RESERVOIR ST, LANCASTER, PA 17602

SEAL:

MAROTTA/MAIN ARCHITECTS

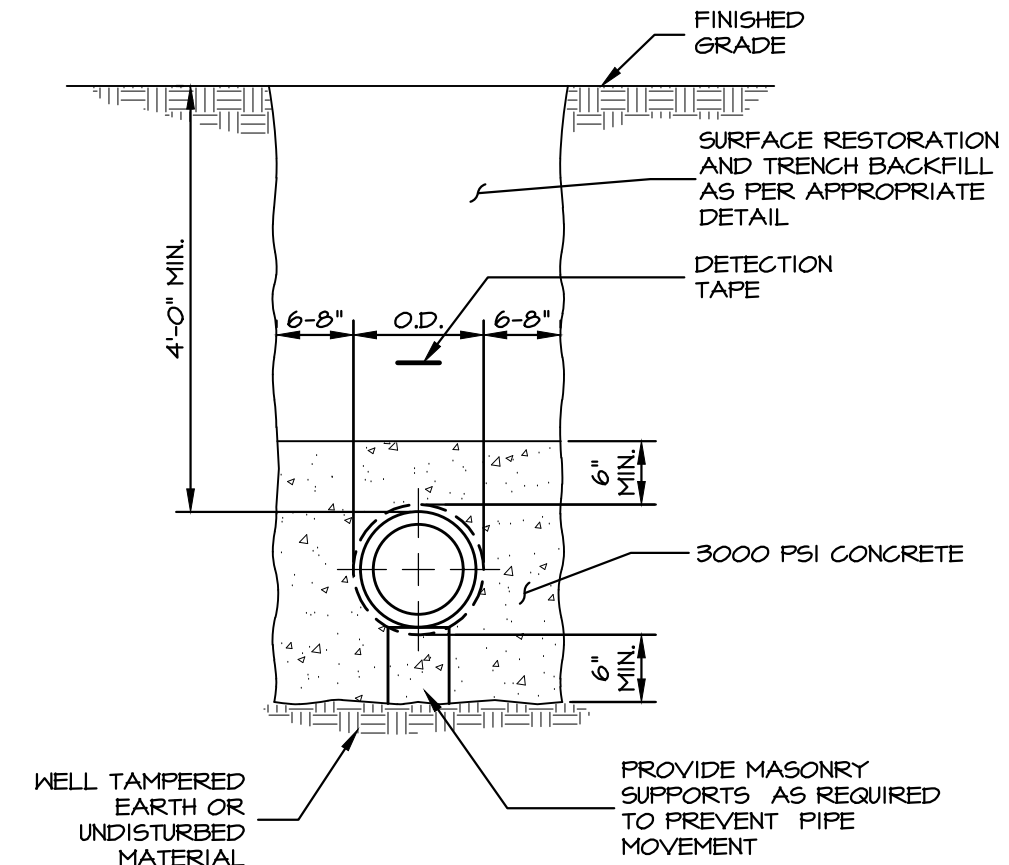
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School District of Lancaster

Together We Can!

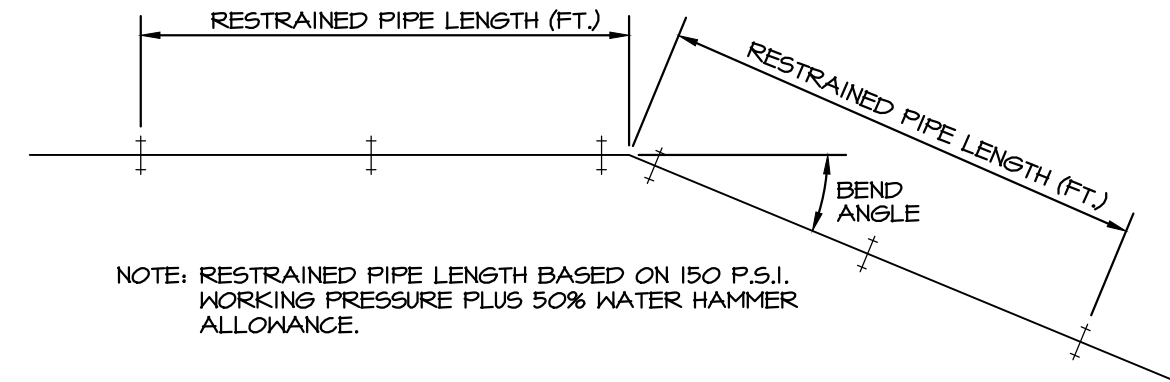
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- NOTES:
1. CONCRETE ENGAGEMENT TO BE USED WHERE MINIMUM CLEARANCE CANNOT BE OBTAINED BETWEEN WATER LINE AND SANITARY SEWERS AND STORM SEWER. ENGAGEMENT SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER IN THE FIELD.
 2. THE CONTRACTOR SHALL BE RESPONSIBLE TO PREVENT FLOATION OF THE PIPE WHEN CONCRETE IS POURED.

A CONCRETE ENCASEMENT
NO SCALE CIV-309

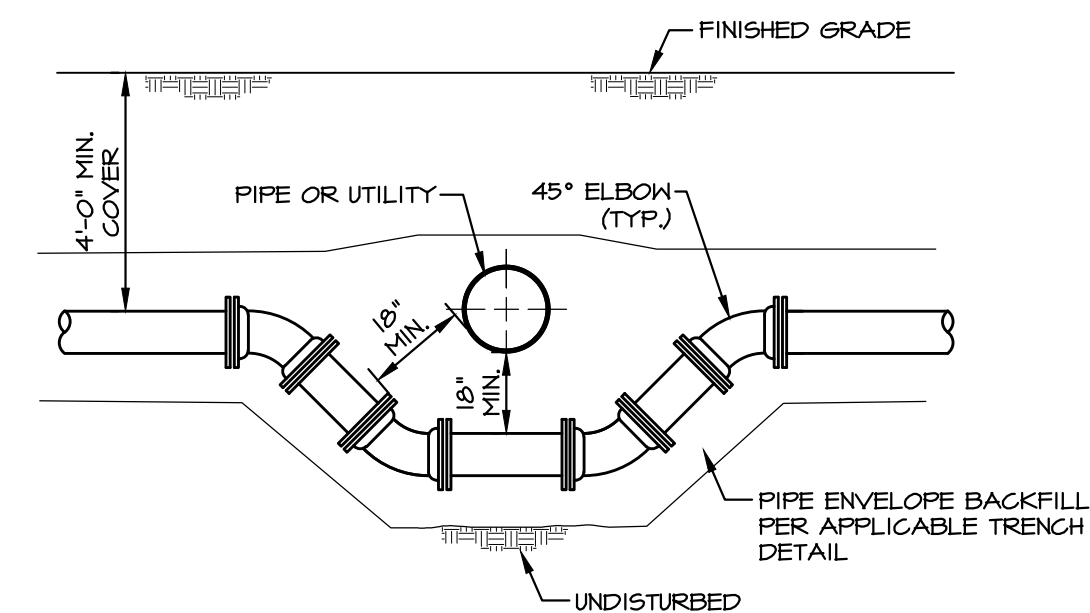


PIPE DIAMETER	HORIZONTAL ELBOW DEFLECTION ANGLE			
	40°	45°	22 1/2°	11 1/4°
1 1/2" THRU 4"	21'	11'	6'	3'
6"	38'	19'	10'	4'
8"	44'	20'	11'	6'
10"	54'	24'	12'	7'
12"	64'	28'	14'	8'

PIPE DIAMETER	VERTICAL ELBOW DEFLECTION ANGLE		
	45°	22 1/2°	11 1/4°
1 1/2" THRU 4"	28'	14'	7'
6"	34'	20'	10'
8"	52'	28'	18'
10"	62'	34'	19'
12"	73'	35'	11'

NOTE: FOR PIPE SIZES GREATER THAN 12", SUBMIT ENGINEERING CALCULATIONS TO VERIFY PROPOSED RESTRAINED PIPE LENGTHS.

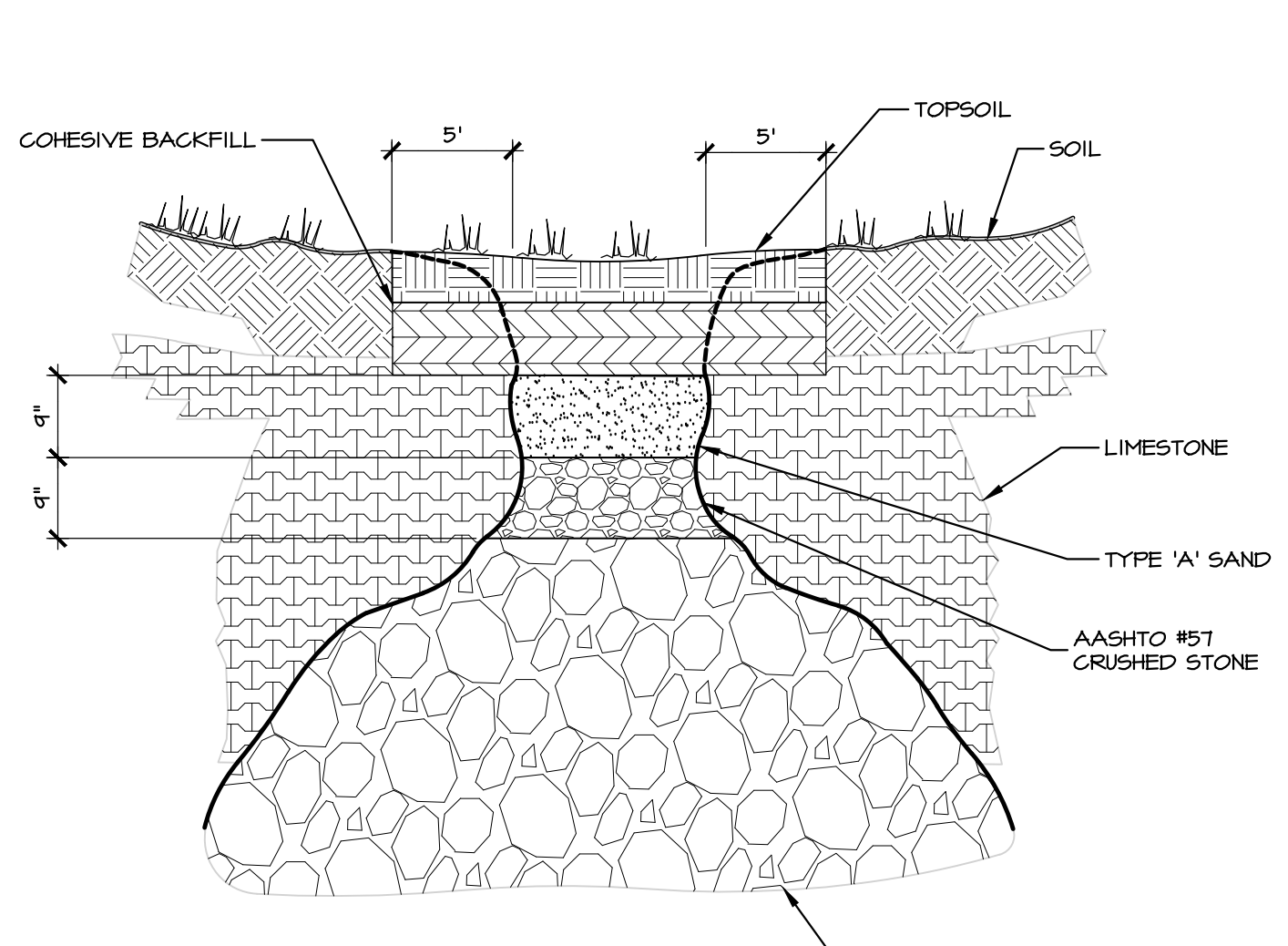
B PVC RESTRAINED PIPE LENGTH SCHEDULE
NO SCALE CIV-302



NOTE TO DESIGNER:
SEE NOTES FOR ADDITIONAL DETAILS REQUIRED WHEN USING THIS DETAIL

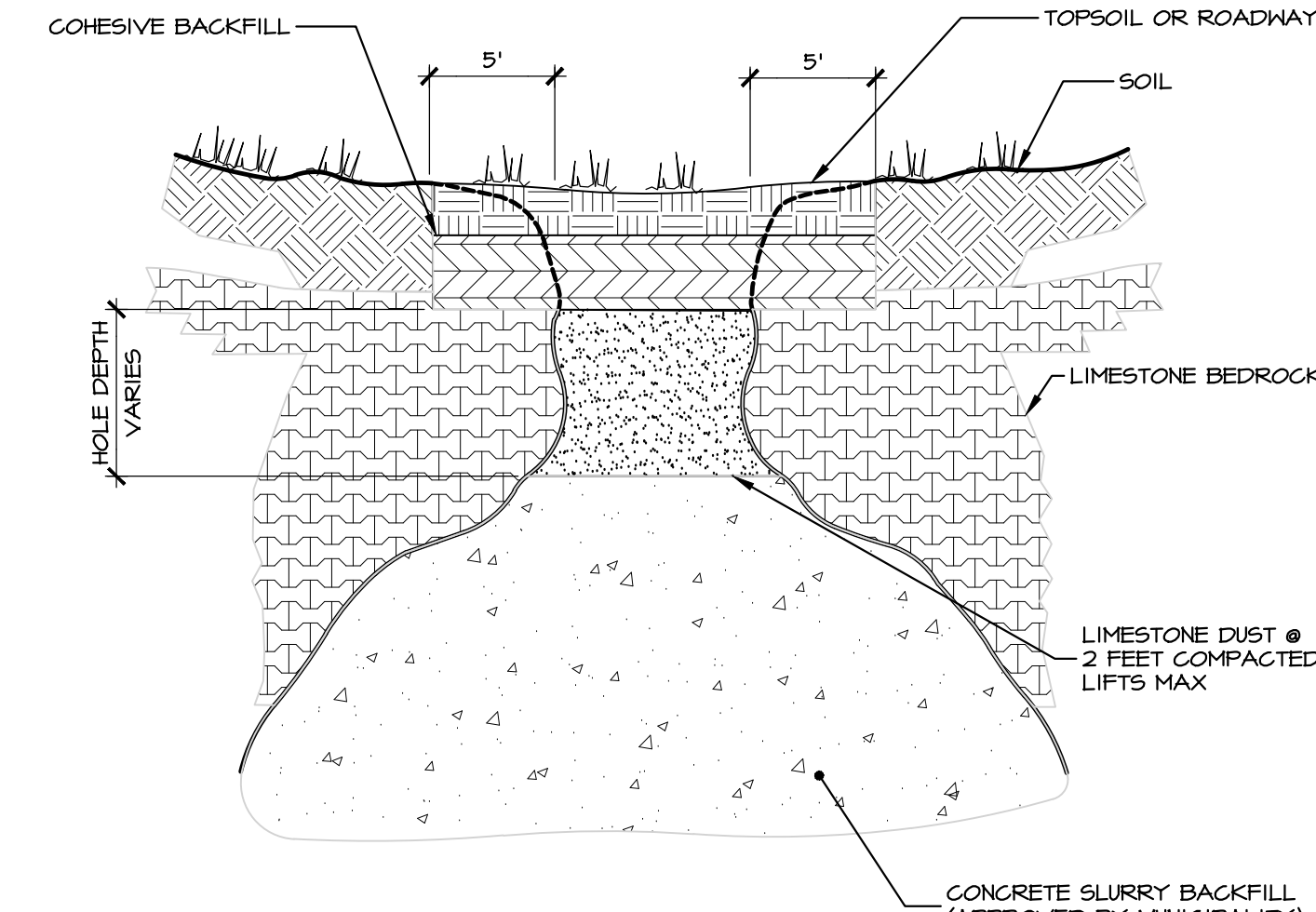
- NOTES:
1. BENDS SHALL BE RESTRAINED AS SHOWN ON THE RESTRAINED PIPE LENGTH SCHEDULE DETAIL, OR THE THRUST BLOCKING FOR HORIZONTAL AND VERTICAL DOWNWARD THRUSTS AND THE THRUST BLOCKING FOR VERTICAL UPWARD THRUSTS DETAILS.
 2. REGARDLESS OF THE THRUST RESTRAINT USED, THE FOUR BENDS OR TWO OFFSETS SHOWN ON THIS DETAIL SHALL BE RESTRAINED JOINT.

C WATER LINE CROSSING PIPE OR UTILITY USING FITTINGS
NO SCALE CIV-406



- NOTES:
1. STRIP ALL SOFT OR UNSUITABLE MATERIALS EXTENDING HORIZONTALLY 5 FEET BEYOND THE PERIMETER OF THE EXISTING SINKHOLE TO A DEPTH OF COMPETENT BEDROCK OR TO 5 FEET BELOW PLAN SUBGRADE, WHICHEVER IS LESS.
 2. FILL SINKHOLE WITH R-3 ROCK TO 10 INCHES BELOW THE LEVEL OF THE STRIPPED SURFACE. USE LARGER ROCK IF NECESSARY TO FILL VOIDS. FILL THE REMAINING 10 INCHES WITH AASHTO #57 CRUSHED STONE AND 4 INCHES OF THE TYPE 'A' SAND AS SHOWN. COMPACT TO AN UNYIELDING CONDITION.
 3. FILL AREA WITH CONTROLLED MATERIAL TO PLAN SUBGRADE, AND REPLACE TOPSOIL.
 4. HEAVY CONSTRUCTION EQUIPMENT SHALL NOT TRAVERSE THE CORRECTED AREA.
 5. THE MUNICIPALITY AND/OR MUNICIPALITY ENGINEER SHALL BE CONTACTED PRIOR TO ANY SINKHOLE REPAIR.

D 'ROCK FILL' SINKHOLE REPAIR DETAIL
NO SCALE



- MUNICIPALITY SINKHOLE REPAIR NOTES:
1. ANY SINKHOLE ENCOUNTERED PRECEDING, OR DURING SITE DEVELOPMENT ON ANY AREA THAT IS INTENDED TO BE OFFERED TO THE MUNICIPALITY FOR DEDICATION BE IT FOR SANITARY SEWER EASEMENT, STREET RIGHT-OF-WAY, STORM SEWER EASEMENT, OR ANY OTHER PUBLIC USE) SHALL BE REPAIRED USING THE FOLLOWING METHODS:
 - A. REMOVE ALL UNSUITABLE SOIL IN THE LOCATION OF THE SINKHOLE IN ORDER TO LOCATED AN OPENING (SINKHOLE "THROAT") IN THE BEDROCK, IF POSSIBLE.
 - B. "THROAT" SHOULD BE FLUSHED WITH WATER TO CLEAR, OPENINGS TO BE IMMEDIATELY FILLED WITH A FLOWABLE FILL OR CONCRETE SLURRY UNTIL MATERIAL BACKS UP IN TO EXCAVATED HOLE. ALLOW CONCRETE TO SETUP FOR TWENTY-FOUR HOURS.
 - C. FILL HOLE WITH LIMESTONE "DUST", COMPACTED IN LIFTS OF TWO FEET MAXIMUM DEPTH.
 - D. REPLACE SUBSOIL IMMEDIATELY BELOW SURFACE AND RESTORE SURFACE AS PER INTENDED USE, I.E. GRASSED AREA, ROADWAY, DRIVEWAY, ETC.
 2. THE MUNICIPALITY AND/OR MUNICIPAL ENGINEER SHALL BE CONTACTED PRIOR TO ANY SINKHOLE REPAIR.

E 'CONCRETE FILL' SINKHOLE REPAIR DETAIL
NO SCALE

REVISIONS PER:	DATE:	BY:
1. -	-	-
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CLIENT:
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(717) 393-3211

MANAGER:	HDC	DATE:	JAN. 29, 2025
ENGINEER:	TWD	PROJECT NO.	AZ202-015
DRAWN BY:	TMO	SCALE:	AS NOTED

DRAWING NO.
CSK-07

MAROTTA / MAIN ARCHITECTS
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REVISIONS
J.P. MCCASKEY STADIUM PROJECTS
SCHOOL DISTRICT OF LANCASTER
445 N RESERVOIR ST, LANCASTER, PA 17602

ISSUE DATES
DATE: 01/17/2025
DESCRIPTION: ADDENDUM 2
01/29/2025
ADDENDUM 4

PROJ # : 24-SBL-03
DRAWN BY: ELA-HDC/BL
SHEET TITLE:
UTILITY DETAILS
SHEET NUMBER:
CSK-07
ADDENDUM 04