

BID # 16-40

**Middlesex County College
Fire Protection Site Improvement Package**

SECTION "C" TECHNICAL SPECIFICATIONS

OWNER

**Board of Trustees
Middlesex County College
2600 Woodbridge Avenue
P.O. Box 3050
Edison, New Jersey 08818-3050**

PREPARED BY

**DLB Associates
265 Industrial Way West
Eatontown, NJ 07724**

2/4/2016

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1. SCOPE OF WORK

The purpose of these specifications is the completion of a contract. This work will be performed at the main Middlesex County College campus in Edison, New Jersey, at the buildings listed below.

The contractor shall provide all of the necessary labor, materials, tools and equipment required to complete the work described on the drawings and in these specifications as follows:

- a. Excavate trenching for new 6" fire protection water mains to each of the following buildings:
 1. College Center
 2. Chambers Hall
 3. Johnson Learning Center
 4. Library
- b. At the connection to the fire water site infrastructure a curb stop valve shall be provided with a curb box.
- c. All Penetrations in to buildings shall be provided with a waterproof seal or seal system.
- d. Immediately after entering the building a house control valve (OS&Y) with tamper shall be provided and the outlet flange shall be blanked off for future connection.
- e. The site mains shall be installed with restraints at all joints and valve connections.
- f. The piping shall be properly bedded and backfilled.
- g. All open trenches shall be fenced in with orange snow fence until they are properly backfilled.
- h. All campus sidewalks, parking lots, turf/ grass areas, and landscaping shall be returned to previous condition per the specifications and drawings.

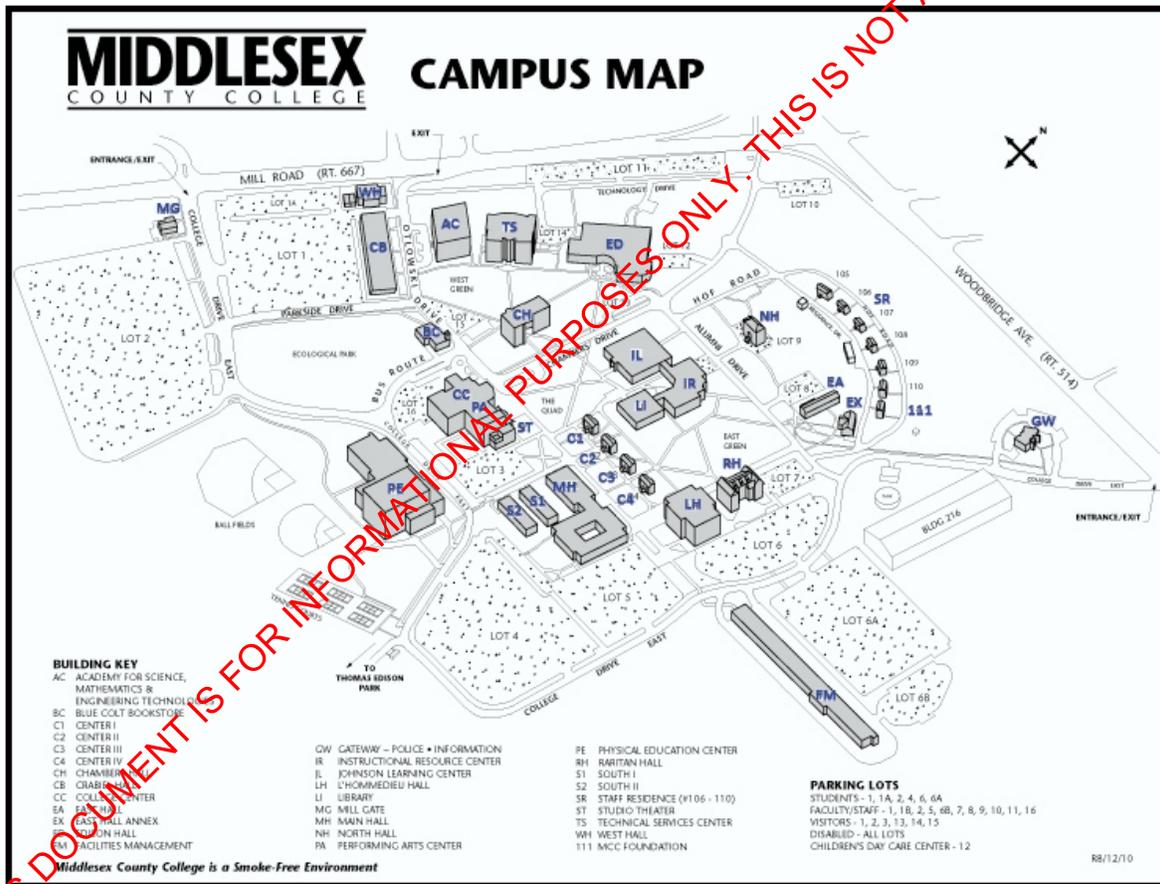
The contractor shall be required to attend a pre-construction meeting on campus at a time to be scheduled after the contract is awarded and other job progress meetings as required by the College and the Architect.

The College Campus in Edison, New Jersey is located on a section of the Former Raritan Arsenal (FRA) which operated from 1918 through 1963. The Army Corps of Engineers (ACE) has completed investigations and remediation activities related to unexploded ordnance (UXO) materials on the campus. While there are no known UXO's at this time, there remains a possibility that they can be discovered when excavating on campus. The ACE has provided an information safety sheet which advises anyone excavating on the FRA to practice the "3R's". They are **Recognize, Retreat and Report**. If any material is discovered that appears to be ordnance, the contractor shall immediately stop work, leave the area, call 911, and notify the College. A procedure has been established for emergency responders and military personnel to safely address such a situation.

The following is a list of drawings that are attached and are a part of these specifications and contract:

- C-001 GENERAL PROJECT INFORMATION
- C-100 OVERALL CAMPUS FIRE WATER SERVICE PLAN
- C-101 COLLEGE CENTER FIRE WATER SERVICE
- C-102 CHAMBERS HALL FIRE WATER SERVICE
- C-103 JOHNSON LEARNING CENTER FIRE WATER SERVICE
- C-104 LIBRARY FIRE WATER SERVICE
- C-501 DETAILS
- C-502 DETAILS
- S-1 GENERAL NOTES AND TYPICAL DETAILS

CAMPUS SITE PLAN



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COMPLIANCE

The Contractor shall comply with all of the College's safety and work rules when performing work at the college. All contractor employees, subcontractors, etc. shall sign-in daily at the Facilities Management Building upon arrival on campus to be issued a contractors identification badge. It is expected that all contractor employees will conduct themselves in a professional

manner.

Middlesex County College is a smoke-free campus. Smoking is only permitted inside a person's personal vehicle. Smoking is not permitted anywhere else on campus or in any construction equipment. The College Police will issue summonses with fines to anyone found in violation of this policy.

3. SITE CLEANUP

The work area shall be cleaned on a daily basis. Any items remaining shall be secured and surrounded with safety tape and/or barriers. Any damage caused by the contractor shall be repaired at no cost to the college.

The contractor is to remove all trash, excavated materials, and other waste off site and disposed of it in accordance with current regulations. Provide the college with weight tickets for any materials that can be recycled. The cost for the testing of any materials prior to the removal from the campus as required by regulatory agencies is the responsibility of the contractor.

4. TIME CONSTRAINTS

If the Board of Trustees of Middlesex County College has approved an award on approximately **March 23, 2016**, the contractor shall complete the work by **August 12, 2016**. If the Board has not approved the award by approximately March 23, 2016, then the College will advise the contractor of an alternate start date.

These time constraints include up to calendar 60 days to obtain permits from the Township of Edison. If the Township has issued a permit after this period due to reasons beyond the contractor's control, then the College will advise the contractor of an alternate completion date. The contractor must submit the permit applications within 7 calendar days of the Notice of Award. This 7 day period is exclusive of the 60 days.

5. WORK HOURS

All work is to be performed during normal work hours 8:00 am to 4:30 pm, Monday through Friday. If additional work hours are required, they shall be included in the contractor's bid price and approval of the College shall be requested by the contractor in writing 48 hours prior to the desired work date.

- Construction on site may start as early as April 20th, with approval of permits and submittals.
- The College Center fire protection service line, which runs through Lot 3 must be completed first, prior to any other work on campus.
 - Lot 3 is scheduled to be milled and paved in its entirety, at approximately the end of May. The fire protection service line shall be trenched, installed, and compacted prior to the lot being paved.
 - Lot 3 is currently being used as a staging area for South Hall (new building), and

will be paved by the General Contractor when the construction trailers are removed.

- o A coordination meeting will be scheduled in April with the South Hall General Contractor, to coordinate the installation of the service line prior to it being paved.
- o The fire protection service line shall be installed in two sections (two halves) in Lot 3, to maintain access to the existing South Hall staging area.

The work hours in this section take precedent over, and will supersede any conflicting references to hours of work elsewhere in these plans and specifications.

6. SCHEDULE OF ALLOWANCES

Allowance No.1 – Unsuitable Soils Replacement – Include in the Base Bid, the amount to provide the Removal and Replacement of 100 cubic yards of unsuitable soils uncovered during excavation of the new fire protection service lines. Replaced soils are to be “in place” including proper compaction as required in the contract documents. Refer to page C-38, Section 14.1 for proper soil materials. These amounts are to include **all** costs including Overhead and Profit, The contractor shall return the **unused** portion of the Allowance at the end of the project to the Owner at the **full unit price** indicated. The contractor’s amount shall be arrived at as follows:

100 cubic yards of Unsuitable Soils Removal and Replacement (X) \$Contractors Unit Price/cubic yard = \$Total Allowance Amount to be included in the Base Bid.

These amounts are to include **all** costs including Overhead and Profit. The Contractor’s amount shall be arrived at using quantities indicated on the **CONTRACTOR’S PROPOSAL** form.

7. WARRANTY

All materials and workmanship shall be replaced at no cost for a period of one year from the date of final payment unless noted otherwise. Refer to specification sections for additional manufacturer warranty limits and terms.

8. PERMITS

The contractor shall apply for and secure a building permit from Edison Township. It is anticipated that the time to obtain a permit could be up to calendar 60 days. The contractor shall allow for this when preparing the project schedule. The fee will be waived by Edison when a letter provided by the College is submitted with the application. As part of the permit process, Edison also requires a Contractor’s License. This fee is the responsibility of the contractor.

The contractor is also responsible for obtaining and paying for a fire permit or any other such permit that may be required by the Township of Edison.

9. ADDITIONAL INFORMATION

Additional information may be obtained from the following individuals:

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Facility/specifications: Dennis Vliet
Manager, Facilities Projects
732-906-2611
732-906-4199 Fax
DVliet@MiddlesexCC.edu

Consulting Engineer Daniel Grieshaber
DLB Associates
732-774-2000
DGrieshaber@DLBAssociates.com

Proposal: David Fricke
Director, Purchasing & Inventory
732-906-2519
732-906-4236 Fax
DFricke@MiddlesexCC.edu

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10. TECHNICAL SPECIFICATIONS

SECTION 210517 - SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING

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. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

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2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Advance Products & Systems, Inc.
 2. CALPICO, Inc.
 3. Metraflex Company (The).
 4. Pipeline Seal and Insulator, Inc.
 5. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Carbon steel.
 3. Connecting Bolts and Nuts: [Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Cut sleeves to length for mounting flush with both surfaces.

- a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
- 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint.
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
 - 5. Interior Partitions:

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- a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.

END OF SECTION 210517

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SECTION 210523 - GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

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

4.2 SUMMARY

- A. Section Includes:
 1. Two-piece ball valves with indicators.
 2. Bronze butterfly valves with indicators.
 3. Iron butterfly valves with indicators.
 4. Check valves.
 5. Bronze OS&Y gate valves.
 6. Iron OS&Y gate valves.
 7. Trim and drain valves.

4.3 DEFINITIONS

- A. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- B. OS&Y: Outside screw and yoke.
- C. SBR: Styrene-butadiene rubber.

4.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.

4.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 1. Protect internal parts against rust and corrosion.
 2. Protect threads, flange faces, and weld ends.
 3. Set valves open to minimize exposure of functional surfaces.

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- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.
- D. Protect flanges and specialties from moisture and dirt.

PART 5 - PRODUCTS

5.1 GENERAL REQUIREMENTS FOR VALVES

- A. UL Listed: Valves shall be listed in UL's "Online Certifications Directory" under the headings listed below and shall bear UL mark:
 - 1. Main Level: HAMV - Fire Main Equipment.
 - a. Level 1: HCBZ - Indicator Posts, Gate Valve.
 - b. Level 1: HLOT - Valves.
 - 1) Level 3: HLUG - Ball Valves, System Control.
 - 2) Level 3: HLXS - Butterfly Valves.
 - 3) Level 3: HMER - Check Valves.
 - 4) Level 3: HMRZ - Gate Valves.
 - 2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
 - a. Level 1: VQGU - Valves, Trim and Drain.
- B. FM Global Approved: Valves shall be listed in its "Approval Guide," under the headings listed below:
 - 1. Automated Sprinkler Systems:
 - a. Indicator posts.
 - b. Valves.
 - 1) Gate valves.
 - 2) Check valves.
 - a) Single check valves.
 - 3) Miscellaneous valves.
- C. Source Limitations for Valves: Obtain valves for each valve type from single manufacturer.
- D. ASME Compliance:

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1. ASME B16.1 for flanges on iron valves.
 2. ASME B1.20.1 for threads for threaded-end valves.
 3. ASME B31.9 for building services piping valves.
- E. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- F. NFPA Compliance: Comply with NFPA 24 for valves.
- G. Valve Pressure Ratings: Not less than the minimum pressure rating indicated or higher as required by system pressures.
- H. Valve Sizes: Same as upstream piping unless otherwise indicated.
- I. Valve Actuator Types:
1. Worm-gear actuator with handwheel for quarter-turn valves, except for trim and drain valves.
 2. Handwheel: For other than quarter-turn trim and drain valves.
 3. Handlever: For quarter-turn trim and drain valves NPS 2 (DN 50) and smaller.

5.2 TWO-PIECE BALL VALVES WITH INDICATORS

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
1. NIBCO INC.
 2. Victaulic Company.
- B. Description:
1. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
 2. Minimum Pressure Rating: 175 psig.
 3. Body Design: Two piece.
 4. Body Material: Forged brass or bronze.
 5. Port Size: Full or standard.
 6. Seats: PTFE.
 7. Stem: Bronze or stainless steel.
 8. Ball: Chrome-plated brass.
 9. Actuator: Worm gear or traveling nut.
 10. Supervisory Switch: Internal or external.
 11. End Connections for Valves NPS 1 through NPS 2: Threaded ends.

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12. End Connections for Valves NPS 2-1/2: Grooved ends.

5.3 BRONZE BUTTERFLY VALVES WITH INDICATORS

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:

1. Fivalco Inc.
2. Globe Fire Sprinkler Corporation.
3. Milwaukee Valve Company.

- B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 1112.
2. Minimum: Pressure rating: 175 psig.
3. Body Material: Bronze.
4. Seat Material: EPDM.
5. Stem Material: Bronze or stainless steel.
6. Disc: Bronze.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Ends Connections for Valves NPS 1 through NPS 2: Threaded ends.
10. Ends Connections for Valves NPS 2-1/2: Grooved ends.

5.4 IRON BUTTERFLY VALVES WITH INDICATORS

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:

1. Anvil International, Inc.
2. Globe Fire Sprinkler Corporation.
3. Kennedy Valve; a division of McWane, Inc.
4. NIBCO INC.
5. Tyco Fire & Building Products LP.
6. Victaulic Company.

- B. Description:

1. Standard: UL 1091 and FM Global standard for indicating valves, (butterfly or ball type), Class Number 112.

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2. Minimum Pressure Rating: 175 psig.
3. Body Material: Cast or ductile iron.
4. Seat Material: EPDM.
5. Stem: Stainless steel.
6. Disc: Ductile iron, nickel plated.
7. Actuator: Worm gear or traveling nut.
8. Supervisory Switch: Internal or external.
9. Body Design: Lug or wafer.

5.5 CHECK VALVES

A. Manufacturers: Subject to compliance with requirements, include but are not limited to, the following:

1. Anvil International, Inc.
2. Fire Protection Products, Inc.
3. Globe Fire Sprinkler Corporation.
4. Kennedy Valve; a division of McWane, Inc.
5. NIBCO INC.
6. Reliable Automatic Sprinkler Co., Inc.
7. Tyco Fire & Building Products LP.
8. Victaulic Company.
9. Viking Corporation.
10. Watts Water Technologies, Inc.

B. Description:

1. Standard: UL 312 and FM Global standard for swing check valves, Class Number 1210.
2. Minimum Pressure Rating: 175 psig.
3. Type: Single swing check.
4. Body Material: Cast iron, ductile iron, or bronze.
5. Clapper: Bronze, ductile iron, or stainless steel with elastomeric seal.
6. Clapper Seat: Brass, bronze, or stainless steel.
7. Hinge Shaft: Bronze or stainless steel.
8. Hinge Spring: Stainless steel.
9. End Connections: Flanged, grooved, or threaded.

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5.6 BRONZE OS&Y GATE VALVES

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
1. Milwaukee Valve Company.
 2. NIBCO INC.
 3. United Brass Works, Inc.
- B. Description:
1. Standard: UL 262 and FM Global standard for fire-service water control valves.
 2. Minimum Pressure Rating: 175 psig
 3. Body and Bonnet Material: Bronze or brass.
 4. Wedge: One-piece bronze or brass.
 5. Wedge Seat: Bronze.
 6. Stem: Bronze or brass.
 7. Packing: Non-asbestos PTFE.
 8. Supervisory Switch: External.
 9. End Connections: Threaded.

5.7 IRON OS&Y GATE VALVES

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
1. Kennedy Valve; a division of McWane, Inc.
 2. NIBCO INC.
 3. Victaulic Company.
 4. Watts Water Technologies, Inc.
- B. Description:
1. Standard: UL 262 and FM Global standard for fire-service water control valves.
 2. Minimum Pressure Rating: 175 psig.
 3. Body and Bonnet Material: Cast or ductile iron.
 4. Wedge: Cast or ductile iron, or bronze with elastomeric coating.
 5. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
 6. Stem: Brass or bronze.
 7. Packing: Non-asbestos PTFE.

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- 8. Supervisory Switch: External.
- 9. End Connections: Flanged.

5.8 TRIM AND DRAIN VALVES

A. Ball Valves:

- 1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Milwaukee Valve Company.
 - b. NIBCO INC.
 - c. Potter Roemer.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - f. Watts Water Technologies, Inc.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port size: Full or standard.
 - e. Seats: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome plated brass.
 - h. Actuator: Handlever.
 - i. End Connections for Valves NPS 1 through NPS 2-1/2: Threaded ends.
 - j. End Connections for Valves NPS 1-1/4 and NPS 2-1/2: Grooved ends.

B. Angle Valves:

- 1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Fire Protection Products, Inc.
 - b. NIBCO INC.
 - c. United Brass Works, Inc.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Brass or bronze.

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- c. Ends: Threaded.
- d. Stem: Bronze.
- e. Disc: Bronze.
- f. Packing: Asbestos free.
- g. Handwheel: Malleable iron, bronze, or aluminum.

C. Globe Valves:

- 1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. NIBCO INC.
 - b. United Brass Works, Inc.
- 2. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Bronze with integral seat and screw-in bonnet.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc Holder and Nut: Bronze.
 - f. Disc Seat: Nitrile.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 6 - EXECUTION

6.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

6.2 GENERAL REQUIREMENTS FOR VALVE INSTALLATION

- A. Comply with requirements in the following Sections for specific valve installation requirements and applications:
 - 1. Section 211100 "Facility Fire-Suppression Water-Service Piping" for application of valves in fire-suppression water-service piping outside the building.
- B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
- D. Install valves having threaded connections with unions at each piece of equipment arranged to allow easy access, service, maintenance, and equipment removal without system shutdown. Provide separate support where necessary.
- E. Install valves in horizontal piping with stem at or above the pipe center.
- F. Install valves in position to allow full stem movement.
- G. Install valve tags. Comply with the NFPA standard applying to the piping system in which valves are installed. Install permanent identification signs indicating the portion of system controlled by each valve.
- H. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections.
- I. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

END OF SECTION 2109-23

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SECTION 211100 - FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 7 - GENERAL

7.1 RELATED DOCUMENTS

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

7.2 SUMMARY

- A. Section includes fire-suppression water-service piping and related components outside the building and service entrance piping through floor into the building and the following:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-suppression specialty valves.
 - 3. Concrete vaults.
 - 4. Alarm devices.
- B. Utility-furnished products include water meters that are furnished to the site, ready for installation.

7.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
 - 2. Include diagrams for power, signal, and control wiring.

7.4 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 reports.

7.5 QUALITY ASSURANCE

- A. Regulatory Requirements:

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1. Comply with requirements of utility company supplying the water. Include tapping of water mains and backflow prevention.
 2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with FM Global's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

7.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, 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, including fire hydrants, 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.

7.7 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Suppression Water-Service Piping: 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 Owner no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of service without Owner's written permission.

PART 8 - PRODUCTS

8.1 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
- B. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- C. Flanges: ASME B16.1, Class 125, cast iron.

8.2 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Flexible Expansion Joints:
- B. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. EBAA Iron, Inc
 - b. Romac Industries, Inc.
 - c. Star Pipe Products
 - d. Zurn Industries, LLC.
- 2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
- 3. Pressure Rating: 250 psig minimum.
- C. Ductile-Iron Deflection Fittings:
- D. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:

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- a. EBA Iron, Inc
2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig (1725 kPa) minimum.

8.3 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105.
- B. Material: Linear low-density PE film of 0.008-inch minimum thickness or high-density, cross-laminated PE film of 0.004-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Black or natural.

8.4 JOINING MATERIALS

- A. Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCP Series.
- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

8.5 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. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Cascade Waterworks Mfg. Co
 - b. Jay R. Smith Mfg. Co
 - c. JCM Industries, Inc.
 - d. Romac Industries, Inc.
 - e. Viking Johnson
 2. 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.
 3. Standard: AWWA C219.

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4. Center-Sleeve Material: [Manufacturer's standard] [Carbon steel] [Stainless steel] [Ductile iron] [Malleable iron].
5. Gasket Material: Natural or synthetic rubber.
6. Pressure Rating: 150 psig minimum.
7. Metal Component Finish: Corrosion-resistant coating or material.

8.6 CURB VALVES

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. A.Y. McDonald Mfg. Co.
 - b. Mater Meter, Inc
 - c. Mueller Co
 - d. Red Hed Manufacturing Company; a division of Everett J. Prescott, Inc.
- B. Curb Valves: Comply with AWWA C800 for high-pressure, service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.
- C. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.
 1. Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.
- D. Meter Valves: Comply with AWWA C800 for high-pressure, service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

8.7 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:
 1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Ames Fire & Waterworks
 - b. Watts; a Watts Water Technologies Company
 - c. Zurn Industries, LLC.
 2. Standards: ASSE 1047 and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."
 3. Operation: Continuous-pressure applications.

4. Pressure Loss: 10 psig maximum, through middle one-third of flow range.
5. Body Material: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
6. End Connections: Flanged.
7. Configuration: Designed for horizontal, straight through flow.
8. Accessories:
 - a. Valves: UL 262 and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
 - c. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

B. Double-Check, Detector-Assembly Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Ames Fire & Waterworks
 - b. Watts; a Watts Water Technologies Company
 - c. Zurn Industries, LLC.
2. Standards: ASSE 1048 and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5 psig maximum, through middle one-third of flow range.
5. Body Material: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
6. End Connections: Flanged.
7. Configuration: Designed for horizontal, straight through flow.
8. Accessories:
 - a. Valves: UL 262 and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.
 - b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

Backflow Preventer Test Kits:

1. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - a. Conbraco Industries, Inc.
 - b. Watts; a Watts Water Technologies Company

c. Zurn Industries, LLC.

2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

8.8 ALARM DEVICES

- A. General: UL 753 and FM Global's "Approval Guide" listing, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

PART 9 - EXECUTION

9.1 EARTHWORK

- A. Comply with excavating, trenching and backfilling requirements in Section 312000 "Earth Moving."

9.2 PIPING INSTALLATION

- A. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- B. Make connections larger than NPS 2 with tapping machine according to the following:
1. Install tapping sleeve and tapping valve according to MSS SP-60.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- C. Comply with NFPA 24 for fire-service-main piping materials and installation.
- D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install encasement for piping according to ASTM A 674 or AWWA C105.

- E. Bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 36 inches of cover over top.
 - 2. In Loose Gravelly Soil and Rock: With at least 12 inches of additional cover.
- F. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.
 - 1. Terminate fire-suppression water-service piping within the building at the floor slab until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material.
- G. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- H. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
- I. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 210517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

9.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.
- B. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- C. Ream ends of tubes and remove burrs.
- D. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.
- E. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
- F. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron piping couplings, gaskets, lubricant, and bolts.
- G. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9.
- H. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.
- I. Do not use flanges or unions for underground piping.

9.4 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. Concrete thrust blocks.
 - 2. Locking mechanical joints.
 - 3. Set-screw mechanical retainer glands.
 - 4. Bolted flanged joints.
 - 5. Heat-fused joints.
 - 6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches in fire-suppression water-service piping according to NFPA 24 and the following:
 - 1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - 2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - 3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

9.5 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.
- F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- G. Support valves and piping, not direct buried, on concrete piers.

9.6 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

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- 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.
- D. Support NPS 2-1/2 and larger backflow preventers and piping on concrete piers.

9.7 PROTECTIVE ENCLOSURE INSTALLATION

- A. Install concrete base level and with top approximately 2 inches above grade.
- B. Install protective enclosure over valves and equipment.
- C. Anchor protective enclosure to concrete base.

9.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire-department connection to mains.

9.9 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:
 - 1. Valves: Install chain and padlock on open OS&Y gate valve.
 - 2. Post Indicators: Install padlock on wrench on indicator post.
- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect tamper switches and alarm devices to building's fire-alarm system.

9.10 CONNECTIONS

- A. Connect fire-suppression water-service piping to existing fire water main. Use tapping sleeve and tapping valve unless existing tap is present.

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- B. Connect fire-suppression water-service piping to interior fire-suppression piping.

9.11 FIELD QUALITY CONTROL

- A. Use test procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described below.
- B. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- C. Hydrostatic Tests: Test at not less than one-and-one-half times the working pressure for two hours.
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to zero psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- D. Prepare test and inspection reports.

9.12 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for underground fire-suppression water-service piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

9.13 CLEANING

- A. Clean and disinfect fire suppression water-service piping as follows:
 - 1. Purge new 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 NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - 3. 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 or do as follows:
 - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow it to stand for 24 hours.
 - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow it to stand for three hours.

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- c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

9.14 PIPING SCHEDULE

- A. Underground fire-suppression water-service piping NPS 4 shall be one of the following:
- 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints.
- B. Underground fire-suppression water-service piping NPS 6 to NPS 12 shall be the following:
- 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints.
- C. Aboveground and vault fire-suppression water-service piping NPS 5 to NPS 12 shall be grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.
- D. Underslab fire-suppression water-service piping NPS 3 and NPS 4 shall be the following:
- 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and restrained, gasketed joints.
- E. Underslab fire-suppression water-service piping NPS 6 to NPS 12 shall be the following:
- 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, [ductile- or gray-iron, standard-pattern] [or] [ductile-iron, compact-pattern] fittings; glands, gaskets, and bolts; and restrained, gasketed joints.

9.15 VALVE SCHEDULE

- A. Standard-pressure, aboveground and vault fire-suppression water-service shutoff valves NPS 3 and larger shall be one of the following:
- 1. 200-psig, AWWA, iron, OS&Y, metal-seated gate valves.
 - 2. 175-psig, UL-listed or FM Global-approved, iron, OS&Y gate valves.
 - 3. AWWA or UL-listed or FM Global-approved butterfly valves.

END OF SECTION 211100

SECTION 211119 - FIRE-DEPARTMENT CONNECTIONS

PART 10 - GENERAL

10.1 RELATED DOCUMENTS

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

10.2 SUMMARY

- A. Section Includes:
 - 1. Yard-type fire-department connections.

10.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each fire-department connection.

PART 11 - PRODUCTS

11.1 YARD-TYPE FIRE-DEPARTMENT CONNECTION

- A. Manufacturers: Subject to compliance with requirements, include, but are not limited to, the following:
 - 1. Elkhart Brass Mfg. Company, Inc.
 - 2. Fire-End & Croker Corporation.
 - 3. Fire Protection Products, Inc.
 - 4. GMR International Equipment Corporation.
 - 5. Guardian Fire Equipment, Inc.
 - 6. Potter Roemer.
 - 7. Wilson & Cousins Inc.
- B. Standard: UL 405.
- C. Type: Exposed, freestanding.
- D. Pressure Rating: 175 psig minimum.

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- E. Body Material: Corrosion-resistant metal.
- F. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
- G. Caps: Brass, lugged type, with gasket and chain.
- H. Escutcheon Plate: Round, brass, floor type.
- I. Outlet: Bottom, with pipe threads.
- J. Number of Inlets: One (5" Storz Type Connection).
- K. Sleeve: Brass.
- L. Sleeve Height: 18 inches.
- M. Escutcheon Plate Marking: As Required By Local Fire Department
- N. Finish, Including Sleeve: Polished chrome plated.
- O. Outlet Size: NPS 4

PART 12 - EXECUTION

12.1 EXAMINATION

- A. Examine conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of fire-department connections.
- B. Examine roughing-in for fire-suppression standpipe system to verify actual locations of piping connections before fire-department connection installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

12.2 INSTALLATION

- A. Install yard-type fire-department connections in concrete slab support.
- B. Install automatic (ball-drip) drain valve at each check valve for fire-department connection.

END OF SECTION 211119

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SECTION 312000 - EARTH MOVING

PART 13 - GENERAL

13.1 RELATED DOCUMENTS

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

13.2 SUMMARY

- A. Section Includes:
 - 1. Excavating and filling for rough grading the Site.
 - 2. Preparing subgrades for walks, pavements, turf and grasses.
 - 3. Subbase course for concrete walks.
 - 4. Subbase course and base course for asphalt paving.
 - 5. Excavating and backfilling trenches for utilities and pits for buried utility structures.
- B. Related Requirements:
 - 1. Refer to Middlesex County College Exterior Improvement division 32 specification sections and details on C-501 for additional project specific requirements.

13.3 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: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer 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.
- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

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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] [changes in the Work].
 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.
- G. Fill: Soil materials used to raise existing grades.
- H. 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. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
 2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.
- 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: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

13.4 PREINSTALLATION MEETINGS

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

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:
 - a. Personnel and equipment needed to make progress and avoid delays.
 - b. Coordination of Work with utility locator service.
 - c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
 - d. Extent of trenching by hand or with air spade.
 - e. Field quality control.

13.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following manufactured products required:
 1. Controlled low-strength material, including design mixture.
 2. Warning tapes.

13.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

13.7 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving 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 Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify Middlesex County College Facilities Engineering for a markout of the area where Project is located before beginning earth-moving operations.
 1. Contractor is responsible to notify Elizabeth Town Gas Company for complete markout of the natural gas infrastructure.

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- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures are in place.
- E. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- F. Do not direct vehicle or equipment exhaust towards protection zones.
- G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 14 - PRODUCTS

14.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. 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 zero to 5 percent passing a No. 8 sieve.
- I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- J. Sand: ASTM C 33/C 33M; fine aggregate.
- K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

14.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
 - 1. Blue: Water systems.

PART 15 - EXECUTION

15.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

15.2 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.

15.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

15.4 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - e. 6 inches beneath bottom of concrete slabs-on-grade.
 - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

15.5 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. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

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3. 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.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

15.6 EXCAVATION FOR WALKS AND PAVEMENTS

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

15.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

- 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. Clearance: 12 inches each side of pipe or conduit.

- C. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

- D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

15.8 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.

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- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water or construction activities, as directed by Architect, without additional compensation.

15.9 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 Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

15.10 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.

15.11 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for Record Documents.
 - 3. Testing and inspecting underground utilities.
 - 4. Removing concrete formwork.
 - 5. Removing trash and debris.
 - 6. Removing temporary shoring, 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.

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15.12 UTILITY TRENCH BACKFILL

- A. Refer to Middlesex County College Exterior Improvements division 32 specification sections and details on C-501 for additional project specific requirements.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- D. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- E. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab supports 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 course.
- F. Backfill voids with satisfactory soil while removing shoring and bracing.
- G. Initial Backfill:
 - 1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- H. Final Backfill:
 - 1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- I. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

15.13 SOIL FILL

- A. Refer to Middlesex County College Exterior Improvements division 32 specification sections and details on C-501 for additional project specific requirements.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- C. 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.
- D. Place soil fill on subgrades free of mud, frost, snow, or ice.

15.14 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
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 exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

15.15 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Refer to Middlesex County College Exterior Improvements division 32 specification sections and details on C-501 for additional project specific requirements.
- B. 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.
- C. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
1. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
 2. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
 3. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

15.16 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.

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- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

15.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Refer to Middlesex County College Exterior Improvements division 32 specification sections and details on C-501 for additional project specific requirements.
- B. Place subbase course on subgrades free of mud, frost, snow, or ice.
- C. On prepared subgrade, place subbase course 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 course to required crown elevations and cross-slope grades.
 - 3. Place subbase course 6 inches in compacted thickness in a single layer.
 - 4. Place subbase course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 4 inches thick.
 - 5. Compact subbase 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.
- D. Pavement Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

15.18 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
 - 2. Determine that fill material classification and maximum lift thickness comply with requirements.
 - 3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

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- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. 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 Architect.
- E. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
 - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
 - 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.
- F. 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 materials to depth required; recompact and retest until specified compaction is obtained.

15.19 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Provide protective fencing around all areas of open trenching.
- C. Provide steel plates at all walkways with temporary access and drive isles with loading dock or parking lot access required above the open trench.
- D. 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.
- E. 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.

15.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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SECTION 320000 - EXTERIOR IMPROVEMENTS

1. Compliance - All Concrete And Asphalt Road, Parking Lot, And Sidewalk Work Shall Comply With The New Jersey Department Of Transportation Standard Specifications For Road And Bridge Construction, 2007 Or The Latest Revisions.
2. All Necessary Traffic Controls Shall Be Provided By The Contractor.
3. Where Concrete Wheel Stops Are Required In Parking Lots, They Shall Be Held In Place With A Minimum Of (2) Steel Dowels Which Penetrate The Asphalt Paving A Minimum Of 6". All Wheel Stops Shall Be Finished Concrete.
4. Bollards
 - a. Base: 3-3/4" (Interior Diameter) Galvanized Pipe Embedded A Minimum Of 2'-0" Into The Ground.
 - b. Removable Bollard: 3-1/2" Diameter Galvanized Steel Pipe With Galvanized Cap Installed Into The New Pipe Sleeve. Top Of Bollard Shall Be 42" Above The Finished Grade Once Installed.
5. Disposition Of Excavated Materials – Consult With Mcc As To Whether Certain Materials Are To Be Left On Site For Use By Mcc.

SECTION 321216 - ASPHALT PAVING

1. Asphalt Walkways
 - a. Straight Edges Within 1", Saw-Cut Edges If Necessary
 - b. Typically 2" Finished Surface Course Over 4" Compacted Dga. If Walkways Are Subject To Light Vehicular Traffic, The Walk Should Be A 2" Finished Surface Course Over 4" Stabilized Base Over 4" Compacted Dga.
 - c. Saw-Cut And Keyed (1' X 2" Surface And 1' X 2" Base Keyway) To Join Existing Walkway
2. Asphalt Roads And Parking Lots
 - a. Shall Be Designed According To Applicable Codes And Application
 - b. Typically Asphalt Roads Are 2" Finished Surface Course Over 6" Stabilized Base Over 6" Compacted Dga.
 - c. Typically Asphalt Parking Lots Are 2" Finished Surface Course Over 4" Stabilized Base Over 6" Compacted Dga
3. Millings And Recycled Concrete Are Acceptable For Use In Lieu Of Dga.

4. Parking Lot And Roadway Striping – The Parking Lot Space Striping Color Coding To Be Used Is Green For Staff, Yellow For Visitors, White For General Parking, And Blue For Accessible Parking. Reflective Yellow Paint To Be Used For Roadway Lane Dividers. Painted Striping Shall Be Thermoplastic Roadway Striping, Where Applicable, Reviewed And Approved By Mcc’s Facilities Management Staff.
5. Asphalt Tolerances
 - a. Base Course - Plus 1/2", Minus 0.
 - b. Surface Course - Plus 1/4", Minus 0.
 - c. Surface Straightness - 1/4" Using A 10 Foot Straight Edge Parallel With And Perpendicular To The Center Line Of The Paved Area.

SECTION 321313 – CONCRETE PAVING

1. Concrete Walkways, Roads, And Plazas.
 - a. Shall Be Designed According To Applicable Codes And Application
 - b. Smooth Non-Slip Finish At All Locations.
 - c. At All Locations, 6" Concrete Over 4" Dga, Reinforced With 6x6 W2.9/2.9 (6/6) Welded Wire Mesh.
 - d. 5 Feet Wide Minimum For All Walkways
 - e. Provide Drawing For Decorative Joint Pattern For Approval.
2. Expansion/Isolation Joints
 - a. Expansion/Isolation Joint Filler Material Shall Be Expanded Closed Cell Polyethylene Flexible Foam. Preferred Product Is A.P.S. Closed Cell Poly Foam Manufacturer Is A.P.S. Supply Co. Of Beverly, Nj. Color Shall Be White. Thickness Shall Be ½" With ½" Tear-Off Strip For Caulking.
 - b. Joint Sealant Shall Be A One-Part, Moisture Cure, Self-Leveling Polyurethane. Preferred Product Is Vulkem 45 Manufactured By Tremco Inc. Of Beachwood, Ohio. Color Shall Match That Of The Cured Concrete.
3. Curbing
 - a. Curbing Is Desired Where Possible
 - b. Concrete Curbing Is To Be 8" Wide At The Base, 18 " Deep, With 6" Exposed.
 - c. Curb-Cuts And Depressed Curbs Shall Be Installed Where Necessary And In Accordance With Ada And Other Applicable Regulations.
 - d. At All Curb-Cuts And Ada Compliant Ramps, Install Recessed Cast In Place Detectable Warning Tile.
 - i. Preferred Manufacturers:
 1. Armor-Tile. (Basis Of Design), Color: Light Gray (Federal No. 26280)
 2. Ada Solutions.
 3. Vanguard Ada Systems Of America.

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- 4. Concrete Tolerances
 - A. Surface Straightness - 1/4" Using A 10 Foot Straight Edge Parallel With And Perpendicular To The Center Line Of The Paved Area

SECTION 321316 - DECORATIVE CONCRETE PAVING

- 1. Stenciled Concrete Shall Be Incorporated Into Cast-In-Place Concrete Walkways And Plazas.
 - a. The Concrete Shall Have A Minimum Compressive Strength Of 4,000 Psi.
 - b. Approved Patterns: Soldier Course Brick And Running Bond Brick.
 - c. Preferred Manufacturer: Bomanite Corporation, Madera, Ca.
 - d. The Stenciled Areas Shall Be Colored Using Bomanite® Color Hardener Brick Red, And Patterned Using Bomanite Stencil(S).
 - e. The Concrete Shall Be Cured And Sealed With Bomanite Clear Sealer After The Stencils Are Removed.
 - f. The Finish Texture Shall Be That Of Standard New Brick.

SECTION 321317 - TEXTURED ASPHALT PAVING

- 1. Textured Asphalt Paving Shall Be Incorporated Into Crosswalks And Walkways.
 - a. Approved Pattern: "Streetprint" Offset Brick.
 - b. Preferred Manufacturer: Integrated Paving Concepts, Inc., Blaine, Wa.
 - c. The Imprinted Areas Shall Be Installed Using Streetbond Premium Series System Hw Premium High Performance, And Colored Using "Streetprint" Brick.
 - d. The Concrete Shall Be Cured And Sealed With Bomanite Clear Sealer After The Stencils Are Removed.

SECTION 329200 - TURF & GRASSES

- 1. Back-Filling And Seeding – A Seeded Lawn Is Preferred Over Sod. All Back-Filling And Seeding And All Other Lawn Area Repairs Are To Be Completed According To The Following Specification:
 - a. Unsuitable Excavated Materials Shall Not Be Used For Back-Filling And Shall Be Properly Disposed Of By The Contractor.
 - b. The Contractor Shall Be Responsible For Any Damage To The Surrounding Site Caused By Their Work And Restore Such Damaged Areas To Their Original Condition.
 - c. Back-Fill Material Up To 16" From The Surface Shall Be Bank-Run Sand Or Equivalent That Shall Be Approved By Mcc.

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- d. All Back-Filled Sited Shall Be Well Tamped By Mechanical Means (Vibratory Plate, Jumping Jack, Etc.) Every 12" Up To The Surface.
- e. The Final 16" Of Surface Material, On Sites To Be Seeded For Lawns, Shall Consist Of Clean Topsoil That Is Free Of Roots, Stones, Clay, Or Any Other Undesirable Material. The Topsoil Shall Contain At Least 5% Organic Matter, Or 2.75% By Weight, Conform To A Ph. Acidity Range Of 5.8 To 7.0, And Have Similar Soil Characteristics To The Project Site. Topsoil Must Conform Particle Size That Has No More Than 20 Percent Retained On A No. 10 Sieve When Mechanically Graded.
- f. Topsoil Shall Be Spread Evenly And Compacted Or Rolled With A 200# Roller. Topsoil Shall Not Be Spread In A Frozen Or Muddy Condition. The Finished Surface Shall Conform To The Surrounding Areas And Be Free From Hollows, Other Inequalities, Or Extraneous Matter.
- g. Fertilizer, Equivalent To A Starter Type Shall Be Applied At A Rate Of 44# Per 10,000 Square Feet .It Shall Have A Commercial Designation Of 10-20-10, Or 1-2-1 Ratio Fertilizer Containing A Minimum Of 5 Percent Nitrogen, 10 Percent Available Phosphoric Acid And 5 Percent Soluble Potash. It Shall Be Evenly Spread On The Site And Raked In Uniformly. Ground Limestone Shall Be Evenly Distributed In An Amount Related To The Ph Required And Worked Lightly Into The Top 3" Of Soil.
- h. Lawn Areas Shall Be Seeded At The Rate Of 5# Per 1,000 Square Feet. It Shall Be Sown In A Uniform Application And Lightly Raked Into The Surface.
- i. Lawn Seed Shall Consist Of Two Or More Superior Varieties Of Kentucky Bluegrass 35%, Red Fescues (Creeping Or Chewing's) 35%, Kentucky 31 20%, Perennial Ryegrass 10%, Provided Grass Seed That Are Not Older Than The Sell Date And Conform To College Requirements. The Turf Seed Label Shall Be Submitted To And Approved By Mcc Prior To Seeding.
- j. All Seeded Areas Shall Be Mulched Immediately After Seeding With Either Weed-Free Straw, Salt Hay Topsoil Stabilizer Matting Either Excelsior Mat 1 Inch In Width And Weighing 0.8 Pounds Per Square Yard Covered By A Bio-Gradable Matter On Both Sides Or Jute Mat Undyed And Unbleached Single Jute Yarn And Weighing 1.2 Pounds Per Linear Yard Of Cloth With A Tolerance Or 5 Percent. If Straw Is Used Then A Tackifier Must Be Used Preferably Synthetic Plastic Emulsion Water Soluble And Does Not Have Phototoxic Or Crop Damaging Properties.
- k. Adequate Protection Shall Be Provided At All Times For Lawn Areas Against Trespassing, Seed Wash-Out, Erosion, And Other Damage Until The Lawn Has Been Established.