

SECTION 09 9726

CEMENTITIOUS COATINGS

PART 1 - GENERAL

1.1 SUBMITTALS:

- A. Product data: Indicate product description and instructions for preparation of surfaces to receive coatings, rates and methods of applications and finishes to be expected in finished work.
- B. Color samples: From coating manufacturer, submit two sets of color samples proposed for use, for color selections by Architect.
- C. Brush-outs:
 - 1. Following final color selections, prepare actual brush-outs for each color and texture.
 - 2. Submit brush-outs in duplicate; minimum size, 120 sq. in.
 - 3. Apply products in number of coats specified for actual work. Execute brush-outs on hardboard.

1.2 QUALITY ASSURANCE:

- A. Applicator qualifications: Applicator shall be approved by product manufacturer in writing. Approval shall indicate the following:
 - 1. Manufacturer has instructed applicator in the installation of specified material.
 - 2. Applicator has been engaged in satisfactory application of the material on projects of similar scope for at least three years.

1.3 DELIVERY, STORAGE AND HANDLING:

- A. Delivery:
 - 1. Deliver materials to project site ready-mixed in original containers, with labels intact.
 - 2. Provide labels bearing manufacturer's name, coating type, color and recommended installation and reducing procedures.
- B. Storage and handling:
 - 1. Store materials in location acceptable to Architect.
 - 2. Maintain neat, clean conditions in storage area; remove rags and waste materials at end of each day's work.
 - 3. Close containers at end of day's work. Leave no materials open.

1.4 PROJECT/SITE CONDITIONS:

- A. Environmental requirements:
 - 1. Comply with manufacturer's product data as to environmental conditions under which materials may be applied.

2. Apply no materials in spaces where dust is being generated.
 3. Apply no materials on surfaces where temperature of substrate would result in excessive drying, which will cause streaks and discoloration.
- B. Protection: Cover finished work of other trades and surfaces not being coated concurrently and prefinished items.
- C. Safety precautions:
1. Provide temporary fire protection equipment in materials storage area.
 2. Prohibit smoking in storage area.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS COATING:

- A. Acceptable product:
1. Pittsburgh Architectural Finishes, Inc., Perma-Crete Fine Texture Coating 100% Acrylic.
 2. BASF Building Systems, Thorocoat Fine Texture.
 3. W. R. Bonsal Co., Acrylocoat Fine Texture.
- B. Characteristics:
1. Type: 100% acrylic-latex decorative coating.
 2. Surface texture: Fine.
 3. Solids by volume: 38%, minimum.
 4. Colors: As selected by Architect from manufacturer's standard selection.
 5. Dry film thickness: Minimum 12 mils. Coating may be applied in one coat if coverage of substrate is obtained.
 6. Prime coat: Type recommended by manufacturer's product data for substrates encountered.
 - a. Prime coat for concrete unit masonry shall be block filler acceptable to manufacturer for exterior application.
 - b. Prime coat thickness shall not be considered in determining dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Perform pH testing and moisture testing to determine alkalinity and moisture content of substrates prior to coating application. Comply with manufacturer's product data.

3.2 PREPARATION:

- A. Surfaces to receive finishes shall be dry and free of debris, oils, dust or other deleterious materials.

- B. Gypsum drywall: Fill narrow, shallow cracks and small holes with patching plaster. Allow to dry and sand smooth without raising nap of gypsum board paper.
- C. Stucco:
 - 1. Allow surfaces to dry prior to applying first paint coat.
 - 2. Fill narrow, shallow cracks and small holes with patching plaster. Allow to dry and sand smooth.
 - 3. Cut out map cracks and repair to same plane and finish as original work.
- D. Concrete:
 - 1. Fill cracks, holes and irregularities with cement grout.
 - 2. Remove laitance, oil, grease, dirt and debris from surfaces. Allow concrete to cure prior to paint application.

3.3 APPLICATION:

- A. Apply coating materials in accord with manufacturer's product data to achieve specified dry film thickness.
- B. Apply coating only when moisture content of surfaces is within manufacturer's recommended limits.
- C. Apply materials using clean brushes, rollers or spraying equipment.
- D. Apply materials at rate not exceeding that recommended by manufacturer's product data for surface being coated, less 10% for losses.
- E. Comply with manufacturer's product data for drying time between coats.
- F. Finish coats shall be smooth, free of brush marks, streaks, laps or pile-up of paint, skipped or missed areas.
- G. Where coating adjoins other materials or colors, make edges clean and sharp, without overlapping.

End of Section

SECTION 10 2113
TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work of this section includes toilet compartments.
- B. Related work specified elsewhere: Toilet Accessories.

1.2 REFERENCES:

- A. Regulatory standards of the following as referenced.
- B. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).
- C. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicap People*, 1992 edition.

1.3 SUBMITTALS:

- A. Submit detailed shop drawings for Architect's review.
- B. Submit product sheets and/or catalogue cuts, of products listed in shop drawings.
- C. Samples: Submit a sample of toilet compartment to Architect for approval. Samples shall be identified including: name of supplier, and name of manufacturer.
- D. Operations and maintenance data: At completion of job, furnish Operation and Maintenance Manuals to Owner.

1.4 QUALITY ASSURANCE:

- A. Supplier Qualifications: A recognized toilet compartment supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying toilet compartments similar in quantity, type, and quality to that indicated for this Project.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Marking and Packaging: Toilet Partitions must be delivered to the job site in the manufacturers' original packages and marked to correspond with the approved shop drawings.

1.6 WARRANTY:

- A. Warranty: Toilet Partition manufacturer shall guarantee toilet compartments by written certification, for a period of 20 years against breakage, delamination, and corrosion of solid plastic parts. Warranty shall begin on Date of Substantial Completion.

1.7 MAINTENANCE:

- A. At completion of project, brief Owner's maintenance staff regarding proper care of Toilet Partitions, such as: required lubrications, adjustments, cleaning, etc.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Approved Manufacturers:
1. Basis of design: Hadrian, Inc.
2. Knickerbocker.
3. Sanymetal.

2.2 MATERIALS:

- A. Construction: Doors, panels and pilasters shall be polypropylene solid plastic. Self-lubricating surface to be resistant to marking and can be maintained effectively with ordinary cleaners.
- B. Doors: Shall be 1" thick by 55" high straight cut with fine radius edges.
- C. Panels: Shall be 1" thick by 55" high straight cut with fine radius edges.
- D. Pilasters: Shall be 1" thick and straight cut with fine radius edges.
- E. Hardware and Fittings:
1. Install doors with 1/8" thick extruded clear anodized, 8" rounded aluminum hinges, which wrap around both the door and pilaster. Hinges shall be fastened to door and pilaster with tamper-proof 6-lobe security head stainless steel thru-bolts and to the edge of door and pilaster with #10 by 1" screw. Top hinges shall have adjustable nylon cams.
2. Strike-keeper and throw latch shall be of extruded clear anodized aluminum.
3. Three heavy-duty aluminum brackets shall be used at panel to wall connection and a full-height continuous aluminum channel shall be used at panel to pilaster connection.
4. Coat hook & bumper shall include a solid cast zinc hook and oversized black rubber bumper that functions as both a door stop and bag hook.
5. Fasteners shall be theft-proof 6-lobe security head stainless steel screws.

6. Pilasters shall be securely and rigidly fastened to structural steel or pre-cast concrete supporting member in ceiling (note: wood support is not acceptable) by means of two heavy hanging studs permitting vertical adjustment between bottom of supporting member and finished ceiling line. Heavy hanging studs to be attached to pilasters by means of a heavy duty, 3/8" thick mounting bracket. Ceiling fastening shall be concealed and protected by a 4" high solid plastic pilaster shoe. Ceiling hung partitions shall be additionally stabilized by means of a 3" stabilizer mounted 7'-0" from finished floor continuous around interior of stall.
- C. Finish: Doors, panels, and pilasters shall be constructed of matte finished polypropylene with uniform color throughout. Color shall be as selected from Hadrian's color selector by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine all site conditions that prevent the proper application and installation of toilet partitions. Any defect shall be immediately identified and corrected, prior to installation of partitions.

3.2 INSTALLATION:

- A. Mounting Locations: Mount toilet partitions according Manufacturers standard locations and those specified on drawings.

3.3 FIELD QUALITY CONTROL:

- A. After installation has been completed, provide for a site inspection of toilet partitions to determine that all items have been supplied and installed in accord with product data and approved shop drawings. Also, check operation and adjustment of all toilet partitions. Correct discrepancies, or malfunctioning product.

3.4 ADJUSTMENT AND CLEANING:

- A. At date of Substantial Completion, toilet partitions shall be left clean and free from disfigurement. Make all final adjustments. Where toilet partitions are found defective, repair or replace or otherwise correct as directed.

3.5 PROTECTION:

- A. Protect toilet partitions from damage until Date of Substantial Completion.

End of Section

SECTION 10 2813

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY:

- A. Related work specified elsewhere:
1. Concrete unit masonry.
 2. Toilet compartments.

1.2 DESIGN CRITERIA:

- A. In order to be acceptable, products shall comply with the following criteria:
1. All accessories shall be products of a single manufacturer.
 2. Keying: Keyed accessories shall be keyed alike, unless otherwise specified.
 3. Operation: Control and operating mechanisms shall be operable with one hand, without tight grasping, pinching, or twisting of wrist, and with a maximum force of 5 lbf.
 4. Cabinet construction:
 - a. Material: Entire cabinet shall be constructed of 18-8 S, Type 304 stainless steel, minimum 22 ga., except that doors of flush face cabinets shall be minimum 18 ga.
 - b. Finish: Satin finish, vertical grain stainless steel; matching in color and graining within the same cabinet.
 - c. Unit construction: Seamless or welded; all welds ground smooth prior to finishing on exposed surfaces. Cabinets shall have full, continuous backs and sides. Flush face units shall be seamless construction.
 - d. Hinges: Doors shall be hung on continuous stainless steel piano hinges.
 - e. Stops: Doors shall have spring or cable stops located inside cabinet to limit opening to 120 degrees maximum.
 - f. Bumpers: Doors shall have rubber bumpers to cushion door closing.
 - g. Exposed edges: Hemmed, returned or flanged; sharp edges not allowable.
 - h. Paper towel dispensers: Adaptable to dispense C-fold, multi-fold or single-fold towels without use of additional towel trays.
 - i. Feminine napkin/tampon vendors: Changeable coin mechanisms and coin slot identification; lockable coin box keyed differently from other accessories.
 - j. Combination towel/waste units: Capable of mounting such that towel dispenser is located at 3'-4" above finish floor, while allowing at least 4" base below unit.

5. Soap dispensers:
 - a. Valves: All-purpose dispensing type; piston and exposed components of Type 302/304 stainless steel or chrome-plated brass.
 - b. Lavatory-mounted dispensers: Capable of being filled from top, without removal of container.
 - c. Lavatory dispenser container: Minimum 32 oz. capacity, rigid polyethylene.

1.3 SUBMITTALS:

- A. Product data: Include catalog cuts and data sheets indicating size, material and finish, complete parts list and installation procedures for each accessory. Where manufacturer's standard products vary with design criteria, indicate compliance with design criteria.
- B. Samples: Submit one actual sample of each accessory for approval if requested by Architect. Upon approval, samples will be returned for incorporation into project.

1.4 QUALITY ASSURANCE:

- A. Applicable standards; comply with the following as referenced herein: Americans with Disabilities Act (ADA).

1.5 PROJECT/SITE CONDITIONS:

- A. Protection: Maintain manufacturer's protective covering on accessories until final cleanup of installation.
- B. Coordinate this work with work of other trades into which accessories are to be installed.

PART 2 - PRODUCTS

2.1 TOILET ACCESSORIES:

- A. Acceptable manufacturers; subject to compliance with specified design criteria:
 1. A & J Washroom Accessories.
 2. American Specialties, Inc. (ASI).
 3. Bobrick Washroom Equipment, Inc.
 4. Bradley Washfountain Co.
- B. Recessed towel dispenser and waste receptacle (for 7-5/8" minimum recess):
 1. A & J #U653.
 2. ASI #04697.
 3. Bobrick #B-3900.
 4. Bradley #237.
- C. Recessed feminine napkin/tampon dispenser (for 4" minimum recess):
 1. A & J #U526.
 2. ASI #0464.
 3. Bobrick #352.
 4. Bradley #401-000000.

- D. Partition-mounted feminine napkin disposal cabinet for two toilet compartments:
 - 1. A & J #U580.
 - 2. ASI #0472.
 - 3. Bobrick #B-354.
 - 4. Bradley #4721.

- E. Recessed feminine napkin disposal cabinet for single compartment or endwall:
 - 1. A & J#U581.
 - 2. ASI#0473.
 - 3. Bobrick #B-353.
 - 4. Bradley #4731-150000.

- F. Surface-mounted feminine napkin disposal cabinet:
 - 1. A & J #U582.
 - 2. ASI #0473A-1.
 - 3. Bobrick #B-254.
 - 4. Bradley #4722-15.

- G. Double-roll toilet tissue dispenser:
 - 1. A & J #U806-LCD.
 - 2. #0264-1A.
 - 3. Bobrick #B-2740.
 - 4. Bradley #5241-50.

- H. Double-roll toilet tissue dispenser with utility shelf and ash tray:
 - 1. A & J #U816-42.
 - 2. ASI #0697-GA.
 - 3. Bobrick #B-2994.
 - 4. Bradley #5267.

- I. Lavatory-mounted soap dispenser (4" Spout):
 - 1. A & J #U128.
 - 2. ASI #0332.
 - 3. Bobrick #B-822.
 - 4. Bradley #6302-68.

- J. Grab bars, sizes and configurations as shown on the drawings; 1-1/2" diameter, satin finish, concealed mounting:
 - 1. A & J #UG30 Series.
 - 2. ASI #3801 Series.
 - 3. Bobrick #B-6806 Series.
 - 4. Bradley # 8120-001 Series.

- K. Double robe hook:
 - 1. A & J #UX112.
 - 2. ASI #7345-S.
 - 3. Bobrick #6727.

- L. Shower curtain rod:
 - 1. A & J #UB145/UX165.
 - 2. ASI #1204 Series.
 - 3. Bobrick #B-6047.
 - 4. Bradley #9531.

- M. Shower curtain and hooks:
 - 1. A & J #250P-4272 and #UX169.
 - 2. ASI #1200-V42 and #1200-SHU.
 - 3. Bobrick #204-2 and #204-1.
 - 4. Bradley #9533-487200.

- N. Diaper changing station: Horizontal design, mildew-resistant, molded polyethylene body, engineered to support a minimum of 250 lb static weight when opened, with built-in dispenser of sanitary liners.
 - 1. A & J #U945H.
 - 2. ASI #9012.
 - 3. Bobrick #B-2230.
 - 4. Bradley #961.
 - 5. Brocar Products, Inc., #100-EH.
 - 6. Koala Corp., Horizontal Baby Changing Station.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Check opening scheduled to receive recessed or semi-recessed accessories for correct dimensions, depth, plumbness of blocking or frames, and preparation that would affect installation of accessories.

3.2 INSTALLATION:

- A. Install accessories level, plumb and in indicated location. Installation methods shall be as indicated in product data for substrates encountered. Securely attach to blocking or framing members.

- B. Mounting heights: As indicated on drawings and meeting ADA accessibility requirements.

- C. Grab bars:
 - 1. Secure grab bars to wood by direct attachment to studs or to blocking installed between studs.
 - 2. Secure grab bars to metal stud partition by direct attachment to steel studs, using 1/4" diameter toggle bolts, or using minimum 12 ga. by 3" wide steel anchor plates, continuous length required for attachment of grab bar flanges.
 - a. Attach anchor plates to studs on grab bar side of wall, using self-tapping sheet metal screws.
 - b. Where grab bar flanges mount on separate walls, anchor plate shall be of length to span between studs at individual flange locations.
 - c. Attach grab bars to anchor plates using stainless steel machine screws.
 - 3. Attach grab bars to masonry walls using concealed mounting plate, minimum 1/4" diameter through-bolt and minimum 10 ga. steel backup plate.
 - 4. Attach grab bars to masonry walls using 1/4" diameter stainless steel toggle bolts.

- 5. Attach grab bars to toilet partitions using wing tapped steel spacers and stainless steel machine screws. Where grab bar is attached to one side of partition only, spacer shall have minimum 16 ga. satin finish stainless steel backup plate.
 - D. Conceal evidence of drilling, cutting and fitting to adjacent finishes.
- 3.3 ADJUSTING AND CLEANING:
- A. Adjust operating parts of accessories for proper operation.
 - B. Clean and polish exposed surfaces prior to Date of Substantial Completion.
 - C. Deliver accessory schedule, keys and parts manual as part of project closeout documents.

End of Section

SECTION 10 4400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY:

- A. Related work specified elsewhere:
 - 1. Gypsum board systems.
 - 2. Concrete unit masonry.
 - 3. Painting and coating.

1.2 SUBMITTALS:

- A. Shop drawings: Indicate extinguisher location, size, mounting height and method of installation.
- B. Product data: Indicate material types, finishes, ratings, hardware, sizes, fabrication and installation details.

1.3 QUALITY ASSURANCE:

- A. Applicable standards; standards of the following as referenced herein:
 - 1. ASTM International (ASTM).
 - 2. Americans with Disabilities Act (ADA).
 - 3. Factory Mutual (FM).
 - 4. Underwriters Laboratories, Inc. (UL).
 - 5. Inchcape Testing/Warnock Hersey (WH).

1.4 DELIVERY, STORAGE AND HANDLING:

- A. Deliver and store in protective packaging to prevent soiling and physical damage.
- B. Handle to prevent damage to finished surfaces and operating mechanisms.

1.5 PROJECT/SITE CONDITIONS:

- A. Protection: Protect prefinished surfaces from damage or staining. Provide protective covering following installation for duration of project.
- B. Coordinate installation of built-in cabinets with wall construction.

1.6 INSPECTION SERVICE:

- A. Extinguishers shall have an inspection certification tag attached, indicating date of charge and service agent's name and address. Charge date shall not be earlier than sixty days prior to Date of Substantial Completion. Service agent shall be located within 50 miles of project.

- B. Provide an inspection service agreement for inspection and servicing of extinguishers for one year following date of initial charge, as well as for servicing and recharging extinguishers failing to hold charge within the initial one-year period. Recharging extinguishers due to use or vandalism shall not be included in service agreement.

PART 2 - PRODUCTS

2.1 PORTABLE FIRE EXTINGUISHERS:

- A. Acceptable manufacturers; subject to compliance with specified requirements:
 - 1. J. L. Industries, Inc.
 - 2. Larsen Mfg. Co.
 - 3. Potter-Roemer Div./Smith Industries, Inc.
- B. Dry chemical type in steel container: UL-rated 4A:60B:C, 10-lb nominal capacity, multi-purpose dry chemical in enameled-steel container.
- C. Container characteristics:
 - 1. Label: UL and FM.
 - 2. Accessories: Pressure-indicating gauge, hose and nozzle.
 - 3. Operation: Pull-pin and squeeze grip for multiple controlled release.

2.2 FIRE EXTINGUISHER BRACKETS:

- A. Description: Manufacturer's standard wall bracket designed to support extinguisher securely in vertical position on wall or centered in cabinet.

PART 3 - EXECUTION

3.1 EXTINGUISHER INSTALLATION:

- A. Install extinguishers at Date of Substantial Completion, indicating acceptable charge pressure and tagged to show charge date and service agent.
- B. Install wall-hung extinguishers on wall mounting bracket. Secure bracket to wall structure with not less than two anchors.
- C. Mounting heights: As indicated on the drawings and as follows:
 - 1. Maximum forward reach to equipment shall be 4'-0" above finished floor level.
 - 2. Maximum side reach to equipment shall be 4'-6" above finished floor level.
 - 3. Mounting heights shall meet ADA and NFPA requirements.
- D. Install and secure extinguishers in plumb, vertical position with name and operating instructions visible on front of extinguisher.

3.2 CLEANING AND PROTECTION:

- A. Protect installed equipment and finished surfaces from damage or defacement. Replace items which cannot be repaired to satisfaction of Architect.
- B. Prior to date of Substantial Completion, clean and polish all surfaces, including cabinet interiors.

3.3 EXTINGUISHER SCHEDULE:

- A. Provide 10 lb. multi-purpose type extinguishers in locations as indicated or as directed by Architect.
- B. Provide one 10 lb. multi-purpose type extinguisher, wall bracket mounted, in each mechanical, electrical, telephone and equipment room and in loading dock area in locations indicated or as directed by Architect.

End of Section

SECTION 11 1300

LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUBMITTALS:

- A. Product data: Submit manufacturer's product data, including capacities, material types, operating instructions, finishes and sizes, fabrication and installation details and requirements. Indicate compliance with applicable standards.
- B. Shop drawings: Submit shop drawings for dock levelers. Show plans, elevations and sections of equipment, including large scale details. Indicate size, construction and anchorage details.
- C. Maintenance data: Submit operation and maintenance data as part of project closeout documents, including name and address of nearest authorized service representative.

1.2 QUALITY ASSURANCE:

- A. Applicable standards: American National Standards Institute (ANSI), standards as referenced herein.

1.3 PROJECT/SITE CONDITIONS:

- A. Protection: Protect prefinished surfaces from damage or staining. Provide protective covering for equipment following installation until Date of Substantial Completion.
- B. Coordination: Coordinate installation of equipment required to be built into building structure. Secure templates or lay out to rough dimensions provided by equipment manufacturer. Deliver anchorage devices to be built into other work in ample time to cause no delay in project.

PART 2 - PRODUCTS

2.1 MECHANICAL DOCK LEVELERS:

- A. Acceptable products; subject to compliance with specified requirements:
 - 1. Blue Giant Corp.
 - 2. Kelley Co., Inc.
 - 3. Rite-Hite Corp.
- B. Characteristics; meeting ANSI/ASME MH 14.1-1989:
 - 1. Type: Recessed mechanical type.
 - 2. Live load capacity: 20,000 lbs., minimum.
 - 3. Size: As indicated on drawings.
 - 4. Lip: Minimum 11" wide lip extension. Lip shall be automatically retractable.
 - 5. Safety stops: Provide a minimum of two panic safety stops to limit fall of unsupported loaded platform. Maximum fall shall be 8".

6. Operating range: 1'-0" above and 1'-0" below dock level, with 4" tilt accommodation.
7. Toe guards: Full operational range side toe guards.
8. Dock bumpers: Manufacturer's laminated rubber with hot dip galvanized angle end plates, pre-drilled for anchors. Provide anchor bolts suitable for substrate.
9. Accessory materials: Furnish leveler complete with curb angles, self-forming box and installation accessories for installation in concrete work.
10. Finish: Leveler shall be factory-painted safety orange.

2.2 DOCK BUMPERS:

- A. Acceptable manufacturers; subject to compliance with specified requirements:
 1. Durable Mat Co.
 2. Kelley Co., Inc.
 3. Pawling Corp., Standard Products Div.
- B. Characteristics: Laminated, reinforced rubber, size 6" thick by 1'-0" high by length shown. Bumpers shall have hot dip galvanized angle end plates pre-drilled for anchors. Provide fasteners suitable for substrate.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates and verify conditions for installation of dock equipment.
- B. Notify Contractor of defects and conditions not acceptable for equipment installation. Contractor shall correct deficiencies and prepare substrate to condition acceptable to dock equipment installer.
- C. Do not proceed with work until conditions are acceptable for installation of equipment.

3.2 INSTALLATION:

- A. Install dock equipment in accord with manufacturer's product data and approved shop drawings.
- B. Install dock levelers at locations indicated. Install recessed units in pits; secure to pit walls. Adjust for proper operation.
- C. Secure dock bumpers rigid and true to line using hot dip galvanized bolts of size recommended by bumper manufacturer. Pre-set bolts in concrete. Weld to curb angles set in concrete.
- D. Paint components not prefinished, including exposed hot dip galvanized surfaces in accord with Painting and Coating section.

3.3 ADJUSTING AND CLEANING:

- A. Adjust components for smooth, safe operation. Lubricate components as recommended by manufacturer's product data.
- B. Protect installed equipment from damage during remainder of construction.
- C. Clean exterior surfaces just prior to Date of Substantial Completion. Touch-up damaged surfaces to match adjacent finish.

End of Section

SECTION 12 6113

STADIUM SEATING
(ALTERNATE #2)

PART 1 - GENERAL

1.1 SUBMITTALS:

- A. Shop drawings: Indicate seating layouts with dimensioned aisles and seating areas. Indicate methods of attachment to floor.
- B. Product data: Submit manufacturer's product data indicating materials, construction, and installation instructions. Include test reports certifying fire resistance properties of non-metallic components and load/impact test results.
- C. Samples: Submit one full size, operating seat unit for approval by Architect.

1.2 QUALITY ASSURANCE:

- A. Installer qualifications: Engage a manufacturer approved, locally based, experienced installer who regularly installs and services auditorium seating similar in kind, quality and end extent to that indicated for project.
- B. Single source responsibility: Obtain each type of seating unit from a single manufacturer, including accessories, mounting and installation components.
- C. Fire resistance: Plastic seating components shall have a maximum burn rate of 1" per minute when tested in accord with ASTM D635-06.

1.3 DELIVERY, STORAGE AND HANDLING:

- A. Deliver no seating to project site until finishing work in spaces to receive seating is completed.

1.4 PROJECT/SITE CONDITIONS:

- A. Install seating following completion and acceptance of floor finishes by Architect. Overhead and adjacent construction and finishes shall be complete before installation.
- B. Protect seating from damage, or defacement following installation. replace damaged or defaced components.

PART 2 - PRODUCTS

2.1 FIXED SEATING:

- A. Acceptable products:
 - 1. Basis of design: Irwin Seating Co., Patriot 303230.
 - 2. American Seating Co.
 - 3. Preferred Seating Co. Inc.

- B. Characteristics:
 - 1. Mounting: Floor.
 - 2. Width: 21".
 - 3. Color: Match Irwin #86 Mauve Brown.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Verification of conditions: Verify that areas to receive seating are free of impediments interfering with installation. Verify that conditions of installation substrates are acceptable to receive seating units, in accord with manufacturer's product data. Do not begin installation until conditions are acceptable.
- B. Install seating in accord with manufacturer's product data and approved shop drawings. Provide accessories, anchors, fasteners, inserts and other components for attachment of telescoping seating to adjoining construction.
- C. Install and adjust operating mechanisms.
- D. Just prior to Date of Substantial Completion, clean seating installation, including concealed stack area, of debris. Clean exposed surfaces of dust and dirt. Replace components with damaged or marred surfaces unless corrected to satisfaction of Architect.
- E. Protect seating units against damage and deterioration until Date of Substantial Completion.

End of Section

SECTION 31 3116

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work of this Section includes soil treatment with termiticide.
- B. Related work: Rough Carpentry section; for wood preservative treatment by pressure process.

1.2 SUBMITTALS:

- A. Product data: Submit product data for termiticide, indicating chemical to be used, installation instructions and copy of container label.
- B. Qualification data: For Installer of termite control products.
 - 1. Soil treatment application report: After application of termiticide is completed, submit report for Owner's record information, including the following:
 - a. Date and time of application.
 - b. Moisture content of soil before application.
 - c. Brand name and manufacturer of termiticide.
 - d. Quantity of undiluted termiticide used.
 - e. Dilutions, methods, volumes, and rates of application used.
 - f. Areas of application.
 - g. Water source for application.
- C. Warranty: Submit warranty as specified herein.

1.3 QUALITY ASSURANCE:

- A. Qualifications: Engage a professional pest control operator, who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Regulatory requirements: Formulate and apply termiticides according to the EPA-Registered Label.
- C. Source limitations: Obtain termite control products through one source.
- D. Pre-installation conference: Conduct conference at Project site to schedule application of soil treatment products.

1.4 PROJECT/SITE CONDITIONS:

- A. Environmental limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of EPA-Registered Label and requirements of authorities having jurisdiction.

1.5 COORDINATION:

- A. Soil treatment: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY:

- A. Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
- B. Warranty period: Five years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE:

- A. Continuing service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, and terms for agreement period; and terms for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Termiticides: Acceptable products, subject to compliance with requirements:
1. Aventis Environmental Science USA LP; Termidor.
 2. Bayer Corporation; Premise 75.
 3. Dow AgroSciences LLC; Dursban TC or Equity.
 4. FMC Corporation, Agricultural Products Group; Talstar, Prevail FT or Torpedo.
 5. Syngenta; Demon TC.

2.2 SOIL TREATMENT:

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at label volume and rate for maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. General: Comply with most stringent requirements of authorities having jurisdiction and with manufacturer's product data for preparation before beginning application of termite control treatment. Remove extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil treatment preparation:
 - 1. Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated.
 - 2. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings.
 - 3. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 4. Fit filling hose connected to water source at site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL:

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT:

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at label volume and rate for maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-grade and lowest level slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.

2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 3. Masonry: Treat voids.
 4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

End of Section

SECTION 32 1217

HIGH PERFORMANCE HMA PAVEMENT TEXTURING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. HMA Pavement texturing shall be defined as a treatment of the surface of Hot Mixed Asphalt (HMA) pavement by imprinting stable, fully compacted HMA pavement with "grid style" or other styles of depressions to replicate, in relief, the concrete grout depressions common to hand-laid brick or cobblestone, or any other design as shown on the drawings or described in the specifications, and coating the imprinted pavement surface using a coating or system of coatings specifically formulated for HMA pavement.
- B. Coatings used in the execution of HMA pavement texturing Work shall be highly specialized and designed to deliver a "balance of performance properties" unique for use on HMA pavement.
- C. Use metal wire rope templates to create the desired imprint pattern. Obtain templates from a qualified template supplier who has the ability to design, develop and manufacture templates to match almost any pattern.
- D. HMA pavement coating supplier shall be capable of providing their coatings in a variety of colors.
- E. HMA pavement coating supplier shall be capable of providing coatings with an SRI greater than 29.
- F. Applicator shall have three years experience in the application of HMA pavement texturing work.

1.2 RELATED SECTIONS:

- A. Site Clearing
- B. Sub-grade and Roadbed Preparation
- C. Unbound flexible base courses.
- D. Flexible Pavement

1.3 REFERENCES:

- A. ASTM D-4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester.
- B. ASTM D-4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrasion.
- C. ASTM D522-93A Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.

- D. ASTM G-155 QUV Accelerated Weathering Environment. Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.
- E. ASTM D-2486 MEK rub test for chemical resistance.
- F. ASTM D-570 Standard Test Method for water absorption of plastics.
- G. ASTM E-303 British Pendulum test for friction.
- H. EPA 24 ASTM D3960-05 Volatile Organic Compounds.

1.4 DEFINITIONS:

- A. "HMA pavement" is Hot Mix Asphalt pavement.
- B. "Qualified Applicator" is a contractor or applicator who has completed HMA pavement texturing work and can provide references upon request.
- C. "Owner" means the Owner and refers to the representative person who has decision making authority for the Work.
- D. "Imprinting HMA pavement" is defined as pressing flexible metal templates into fully compacted, heated HMA pavement to create the appearance of grout lines or patterns in the HMA pavement surface.
- E. "Textured HMA Pavement" is HMA pavement that has been subjected to imprinting or stamping in a specific pattern.
- F. "Non-textured HMA pavement" is HMA pavement that is unstamped and is sometimes referred to as "flatwork".
- G. "Scuffing" of HMA pavement is a "tear" of the HMA pavement caused by an external force. Stationary vehicle tires turning on the pavement surface is a typical cause.

1.5 MINIMUM PERFORMANCE PROPERTIES OF HMA COATING:

- A. The following table outlines the minimum required performance properties of the HMA pavement surface coating. These performance properties must be ascertained by a Certificate of Analysis issued by an approved testing facility.

TABLE 1: Required Performance Properties of HMA Pavement Coating

Characteristic	Test Specification	Measured result
Durability: Taber Abrasion resistance	ASTM D-4060 1 day cure, H-10 wheel: cycles (dry)	<1.5 g/1000 <10% < 1.0%
Color stability	ASTM G-155 QUV 2,000 hours (CIE units)	Brick color ?E < 1.5

Flexibility: Mandrel Bend	ASTM D522-93A Flexibility as measured by Mandrel bend 0.5mm thick sample passes 10 mm at 21°C 0.5mm thick sample passes 125mm at -18°C	
Chemical resistance	ASTM D-2486 Modified MEK scrubs 16 dry mils, number of scrubs until 50% substrate exposed	>5000
Adhesion to Asphalt	ASTM D-4541	Substrate Failure
Friction Wet	ASTM E-303 British Pendulum Tester	>55
Environmental Sensitivity	EPA 24 ASTM D3960-05 Volatile Organic Compounds	VOC < 150

1.6 SUBMITTALS:

- A. Submit HMA pavement mix design.
- B. Submit proof in a form suitable to the Owner of applicator's ability to install HMA pavement texturing.
- C. ASTM Properties and test results of the coating materials.
- D. Confirmation of coating color(s).

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Basis of design: Street Print Pavement Texturing.

2.2 MATERIALS - COATINGS:

- A. Design HMA pavement coatings with scientific formula to provide the optimal balance of performance properties for a durable, long lasting color and texture to HMA pavement surfaces. Key properties include wear and crack resistance, color retention, adhesion, minimal water absorption and increased friction properties. HMA pavement coating shall be environmentally safe and meet EPA requirements for Volatile Organic Compounds (VOC).
- B. Color: Match Street Print "San Diego Buff".

2.3 EQUIPMENT:

- A. The following equipment is to be used in the execution of the Work.
- B. Metal templates manufactured from flexible, woven wire rope cut and welded into the patterns as detailed on drawings, and used for imprinting HMA pavement.

- C. Only equipment that is specifically designed for the re-heating of HMA pavement may be used in the execution of this work. Re-heat equipment shall be designed to gently elevate temperature of HMA pavement without adversely affecting it. Re-heat equipment shall allow operator to monitor temperature of HMA pavement at all times during heating process.
- D. Use coating spray equipment in application of coating and shall be capable of applying coating to HMA pavement surface in a thin, controlled film which will optimize drying and curing time of coating.
- E. Vibratory Plate Compactors shall be used for pressing wire templates into heated asphalt to create specified pattern.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Pavement texturing system shall be supplied and installed by a Qualified Applicator in accord with drawings and specifications. Do not begin installation without confirmation of Applicator certification.

3.2 PRE-CONDITIONS - PAVEMENT:

- A. A high quality, highly stable HMA pavement is a pre-requisite for installation of pavement texturing system.
- B. Requirements of this section are to be used as a guide towards achieving a high quality HMA pavement. It does not supersede other specifications pertaining to this Work, nor does it replace recommendations made by engineer of record for this Work.
- C. Pre-requisites for new HMA pavement:
 - 1. Stable sub-grade or base over which HMA concrete is laid.
 - 2. Proper mix design.
 - 3. Proper placement and compaction practices.
- D. Sub-grade: Sub-grade must be stable and should be inspected to identify areas of soft or yielding soil that are too weak to properly support paving equipment. These soft spots must be over-excavated and re-compacted to meet engineer's requirements. Prior to paving, sub-grade and base courses must be thoroughly and uniformly compacted, properly graded and constructed in accord with engineer's specifications. Please refer to related sections for more exact requirements of this work.

- E. Guidelines for HMA pavement mix design. A durable, stable mix design is a pre-requisite for all long-lasting HMA pavement surfaces, especially those that will experience vehicle traffic. Application of a pavement texturing system does not change this requirement. Generally, HMA pavement mix design for roadways as prescribed by local jurisdiction will be sufficient for application of pavement texturing system. Failure to use a stable mix design may lead to premature failure of HMA pavement such as raveling, rutting or segregation. Appropriate pavement structure is not within the scope of this specification; however, this specification can offer some general guidelines as follows:
1. Stability is a good general guide: Generally, if surface course design has a minimum Marshall Stability of 10 KN (about 2250 lbs) and design densities are achieved during compaction, pavement should perform adequately.
 2. Mix design should include a nominal maximum aggregate size of 12.5mm (1/2"). For clarity, SuperPave defines nominal maximum aggregate size as "one sieve size larger than the first sieve to retain more than 10 percent of material".
 3. For locations that will not experience any vehicle traffic, a more "tender" mix design can be used.
- F. Placement of New HMA Pavement:
1. Successful placement of HMA pavement includes compacting mix when it is hot and compacting mix to achieve the specified air voids. Generally, first pass of rollers shall be done when asphalt mixture is at minimum 230°F (110°C); compaction process shall be completed before in-place temperature of mixture cools to 185°F (85°C) or higher depending on type of asphalt and/or modifiers used. For applications that will experience vehicle traffic and wherever it is possible, compaction shall be completed using a paving machine and a self-propelled roller.
 2. Handwork, which includes placing and spreading by hand and use of hand operated compaction equipment, should be restricted to areas that cannot be accessed by paving machine or self propelled rollers. Compaction shall be completed when pavement is hot as described above. Handwork shall be done carefully and material distributed uniformly so there will be no segregation.
 3. Pavement shall be smooth, without seams and graded to achieve proper drainage.
 4. Note that additional compaction will not be achieved through application of pavement texturing process.
- G. Pre-requisites for existing HMA pavement: Depending upon condition and age, existing HMA pavement may or may not be suitable for successful application of HMA pavement texturing. Applicator shall advise whether HMA pavement is suitable or not.

- H. Mill & Fill: Apply a tack coat to ensure proper adhesion of new HMA material to the old pavement substrate. A durable, stable mix design is a pre-requisite for all Mill & Fill applications - especially those that will experience vehicle traffic. Application of HMA pavement texturing process does not change this requirement. A Minimum lift thickness of two inches is recommended. Due to thin lift thickness placed over a cool substrate, it is especially critical to ensure that HMA concrete is hot when it is delivered, installed and compacted. Do not proceed with a Mill & Fill pavement application when outside air temperature is less than 50°F (10°C).
- I. Pavement Marking Removal:
1. Pavement markings may be removed by sandblasting, water-blasting, grinding, or other approved mechanical methods. Removal methods should, to fullest extent possible, cause no significant damage to pavement surface.
 2. Owner shall determine if removal of markings is satisfactory for application of HMA pavement coating. Work shall not proceed until this approval is granted.

3.3 LAYOUT:

- A. Layout of pattern for imprinting into surface of HMA pavement shall be as indicated on drawings and specifications and in accord to methods prescribed by applicator.

3.4 HEATING THE HMA PAVEMENT:

- A. Applicator shall follow guideline provided by qualified equipment supplier for re-heating HMA pavement.
- B. Pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.
- C. Pavement temperature. Optimal pavement temperature for imprinting template is dependent upon mix design, modifiers used in mix, age of pavement and weather. Surface temperature of pavement should not exceed 325°F as determined by an infra-red thermometer reading taken after heat is applied to HMA pavement.
- D. In order to achieve proper depth of imprint it is important to elevate HMA pavement temperature to a minimum depth of 1/2 inch (12.5mm) without burning pavement surface.

3.5 SURFACE IMPRINTING:

- A. Pavement surface shall be dry and free from all foreign matter, including but not limited to dirt, dust, de-icing materials, and chemical residue.
- B. Only approved HMA pavement re-heat equipment shall be used to elevate temperature of HMA pavement.

- C. Once HMA pavement has reached imprinting temperature, templates shall be placed in position and pressed into surface using vibratory plate compactors. Top of template shall be flush with surrounding HMA pavement and shall then be removed. Areas that have an imprint depth less than 3/8 inch shall be re-heated and re-stamped prior to applying coatings. Hand tooling is a permitted method to achieve proper imprint depth in areas difficult to get at with template.

3.6 APPLICATION OF HMA PAVEMENT COATING:

- A. Applicator shall refer to HMA pavement coating supplier's recommendations for methods of application. Ensure HMA pavement coatings are applied in environmental conditions that permit proper cure.
- B. Pavement surface shall be completely dry and thoroughly cleaned prior to application of HMA pavement coating(s).
- C. Depending upon condition and age of pre-existing pavement, primer may be required. Refer to HMA pavement coating supplier's specifications.
- D. Coating application shall proceed as soon as practical upon completion of imprinting of HMA pavement.
- E. Applicator shall use spray equipment specifically designed for application of coating(s).
- F. Refer to HMA pavement coating supplier's recommendations for coating coverage rate, number of recommended passes and recommended thickness.

3.7 OPENING TO TRAFFIC:

- A. Minimally, surface coating shall be 100% dry before traffic is permitted. Refer to pavement coating supplier's guide.

End of Section

SECTION 32 8400 - IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes furnishing and installing piping, valves, sprinklers, specialties, controls, and wiring for automatic-control irrigation system.

1.3 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Irrigation Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- D. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. FRP: Fiberglass-reinforced plastic.
 - 3. PA: Polyamide (nylon) plastic.
 - 4. PE: Polyethylene plastic.
 - 5. PP: Polypropylene plastic.
 - 6. PTFE: Polytetrafluoroethylene plastic.
 - 7. PVC: Polyvinyl chloride plastic.
 - 8. TFE: Tetrafluoroethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as trees, signs and light

standards. Excavation within drip line of existing trees shall be limited to hand digging. No mechanical excavation equipment will be allowed. Maintain 100 percent water coverage of turf and planting areas indicated.

1. Minimum Working Pressures: Contractor shall determine the available working pressure against the irrigation design and notify the architect of any discrepancies.

1.5 SUBMITTALS

- A. Product Data: Include pressure ratings, rated capacities, and settings of selected models for the following:

1. Water regulators.
2. Water hammer arresters.
3. General-duty valves.
4. Specialty valves.
5. Control-valve boxes.
6. Sprinklers.
7. Irrigation specialties.
8. Controllers. Include wiring diagrams.
9. Control cables. Include splice kits and conduit.

- B. Operation and Maintenance Data: For irrigation systems, to include in emergency, operation, and maintenance manuals per Division 1 Section Closeout Procedures.

- C. As Built Drawings: Upon completion of system, provide owner with reproducible as built plans showing all controllers, valves, equipment and mainline piping.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- B. The Contractor shall maintain a competent superintendent, satisfactory to the owner on the work during progress with authority to act in all matters pertaining to the work.

- C. All materials and construction shall conform to all applicable codes and ordinances. It is the contractor's responsibility to investigate and follow all regulations.

- D. The contractor shall obtain at his expense all required permits and shall pay all required fees. Any penalties imposed due to

failure to obtain all necessary permits or fees shall be the responsibility of the contractor.

- E. Warranty: The contractor shall provide a certificate of warranty registration and a written guarantee of work and materials for a one year period from the date of the final acceptance of the irrigation system by the owner.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

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

1.9 COORDINATION

- A. Coordinate with installation of water meter and electrical connection to controller.
- B. Coordinate irrigation work with all other contractors working on the site. Protect all other work either completed or in progress on the work site.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.

- B. All piping and fittings 2 ½" in diameter or larger shall be equipped with gaskets.
- C. Sleeves: Class 200 PVC. See plan for locations and sizes of all sleeves. Sleeves shall be installed per detail provided on plans. Stub up all sleeves 12" above ground and cap.
- D. All sleeves shall have a horizontal separation of 18" and a maximum of 24" below curb.
- E. Bore: All borings shall be ample size to accommodate the size sleeve specified.
- F. PVC Pipe: ASTM D 1785, PVC 1120 compound, Class 200.
 - 1. PVC Socket Fittings, Schedule 80: ASTM D 2467.
 - 2. PVC Threaded Fittings: ASTM D 2464.

2.2 IRRIGATION VALVES

- A. Bronze Automatic Control Valves: Globe type, cast-bronze body, normally closed, diaphragm type with manual flow adjustment, and operated by 24-V ac solenoid.
- B. Automatic Drain Valves: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa).

2.3 CONTROL-VALVE BOXES

- A. Plastic Control-Valve Boxes: Box and cover, with open bottom and openings for piping; designed for installing flush with grade. Include size as required for valves and service.
 - 1. Shape: Rectangular
 - 2. Sidewall Material: PE
 - 3. Cover Material: PE
 - 4. Manufacturers:
 - a. Ametek or approved equal.
- B. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3/4 inch (19 mm) minimum to 3 inches (75 mm) maximum. Minimum 2 cubic feet per valve box.

2.4 SPRINKLERS

- A. Description: Brass or plastic housing and corrosion-resistant interior parts designed for uniform coverage over entire spray area indicated, at available water pressure.
1. Flush, Surface Sprinklers: Fixed pattern, with screw-type flow adjustment.
 2. Bubblers: Fixed pattern, with screw-type flow adjustment.
 3. Shrubbery Sprinklers: Fixed pattern, with screw-type flow adjustment.
 4. Pop-up, Spray Sprinklers: Fixed pattern, with screw-type flow adjustment and stainless-steel retraction spring.
 5. Pop-up, Rotary, Spray Sprinklers: Gear drive, full-circle and adjustable part-circle types.
 6. Pop-up, Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.
 7. Aboveground, Rotary, Impact Sprinklers: Impact drive, full-circle and part-circle types.

2.5 AUTOMATIC-CONTROL SYSTEM

- A. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
1. Material: Enameled-steel, sheet metal.
 2. Mounting: Pedestal mount as specified on plan.
- B. Interior Control Enclosures: NEMA 250, Type 12, drip-proof, with locking cover and two matching keys.
1. Material: Enameled-steel, sheet metal.
- C. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each station.
- D. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate 2 or more times daily.
1. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
 2. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
 3. Surge Protection: Metal-oxide-varistor type on each station and primary power.
- E. Wiring: UL 493, Type UF-B multiconductor, with solid-copper conductors and insulated cable; suitable for direct burial.

1. Available Manufacturers:
 - a. AFC Cable Systems Inc.
 - b. Alcatel Canada Wire, Inc.
 - c. American Electric Cable Co.
 - d. American Insulated Wire Corp.
 - e. Cerro Wire & Cable Co., Inc.
 - f. Colonial Wire and Cable Co., Inc.
 - g. Essex Group, Inc.; Building Wire Products Division.
 - h. Precision Cable Manufacturing Co., Inc.
 - i. Southwire Company.
 - j. Triangle Wire and Cable Co.
2. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
3. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
4. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial, water tight.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads.
 1. Install piping sleeves by boring or jacking under existing paving if possible.
 2. Trenching within driplines of existing trees shall be limited to hand digging. No mechanical equipment will be allowed.
- B. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from 3/4 to 3 inches (19 to 75 mm), to 12 inches (300 mm) below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
- C. Provide minimum cover over top of underground piping according to the following:

1. Irrigation Main Piping: Minimum depth of 36 inches (914 mm)] below finished grade, or not less than 18 inches (450 mm)] below average local frost depth, whichever is deeper.
2. Circuit Piping: 12 inches (300 mm)].
3. Drain Piping: 12 inches (300 mm)].
4. Sleeves: 24 inches (600 mm)].

3.2 PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

3.3 PIPING APPLICATIONS

- A. Install components having pressure rating equal to or greater than system operating pressure.
- B. Piping in control-valve boxes and aboveground may be joined with flanges instead of joints indicated.
- C. Underground Irrigation Main Piping: Use the following piping materials for each size range:
 1. NPS 4 (DN 100) and Smaller: Schedule 40 PVC pipe, and solvent-cemented joints.
 2. NPS 4 (DN 100) and Smaller: Schedule 80, PVC pipe; threaded or solvent-cemented PVC fittings; and threaded or solvent-cemented joints.
- D. Circuit Piping: Use the following piping materials for each size range:
 1. NPS 2 (DN 50) and Smaller: Class 200 PVC pipe and socket fittings; and solvent-cemented joints.
- E. Sleeves: Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.

3.4 VALVE APPLICATIONS

- A. Control Valves:
 1. NPS 2 (DN 50) and Smaller: Bronze automatic control valve.
- B. Drain Valves:
 1. NPS 1/2 and NPS 3/4 (DN 15 and DN 20): Automatic drain valve.

3.5 PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
- C. Install piping free of sags and bends.
- D. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.
- F. Install unions adjacent to valves and to final connections to other components with NPS 2 (DN 50) or smaller pipe connection.
- G. Install underground thermoplastic piping according to ASTM D 2774.
- H. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- I. Install PVC piping in dry weather when temperature is above 40 deg F 5 deg C. Allow joints to cure at least 24 hours at temperatures above 40 deg F 5 deg C before testing unless otherwise recommended by manufacturer.

3.6 VALVE INSTALLATION

- A. Control Valves: Install in control-valve box.

3.7 SPRINKLER INSTALLATION

- A. Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.
- B. Install sprinklers at manufacturer's recommended heights.
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and 2 inches (50 mm) from other boundaries, unless otherwise indicated.

3.8 AUTOMATIC-CONTROL SYSTEM INSTALLATION

- A. Install controllers on building wall in location to be approved by owner.
- B. Install control cable in same trench as irrigation piping and at least 2 inches (50 mm) below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas if irrigation piping is installed in sleeve.

3.9 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.10 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace units and retest as specified above.

3.11 STARTUP SERVICE

- A. Verify that controllers are installed and connected according to the Contract Documents.
- B. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 16 Sections.
- C. Complete startup checks according to manufacturer's written instructions.

3.12 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers so they will be flush with, or not more than 1/2 inch (13 mm) above, finish grade.

3.13 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain controller and automatic control valves. Refer to Division 1 Section Closeout Procedures."

END OF SECTION 32 8400

SECTION 32 9200 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Seeding.
 - 2. Sodding.
- B. Related Sections include the following:
 - 1. Division 2 Section "Landscape" for installation of trees, shrubs and groundcover.
 - 2. Division 2 Section "Irrigation" for landscape irrigation.

1.3 DEFINITIONS

- A. Finish Grade: Elevation of finished surface of planting soil.
- B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and

percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod, identifying source, including name and telephone number of supplier.
- C. Product Certificates: For soil amendments and fertilizers, signed by product manufacturer.
- D. Qualification Data: For landscape Installer.
- E. Material Test Reports: For existing surface soil and imported topsoil.
- F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

- B. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding."

1.7 SCHEDULING

- A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.

1.8 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
 - 1. Seeded and Sodded Lawns: 30 days from date of Substantial Completion.
 - a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.
- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches (100 mm).
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water lawn at a minimum rate of 1 inch (25 mm) per week.
- D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do

not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 1/2 to 1 inch (13 to 25 mm) high.
- E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to lawn area.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Seed Species: State-certified seed of grass species, as follows:
- C. Seed Species: Seed of grass species as follows, with not less than 95percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 1. Bermudagrass (Cynodon dactylon).

2.2 TURFGRASS SOD

- A. Turfgrass Sod: Certified, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: General Site: Tifton 419 Bermuda
- C. Turfgrass Species: Spectator Lawn: Meyers Zoysia
- D. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

2.3 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 10 percent organic material content; free of stones 1 inch (25 mm)

or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2.4 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:

1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a
2. Provide lime in form of dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.

G. Sand: Clean, washed, natural or manufactured, free of toxic materials.

H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.5 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch (19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

- B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.

- C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - 1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cubic foot (cubic meter) of loose sawdust or ground bark.

- D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.6 PLANTING ACCESSORIES

- A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.7 FERTILIZER

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.8 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.9 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:

1. 60% Topsoil as specified.

2. 40% prepared additives (by volume as follows):

2 parts humus and/ or peat

1 part shredded pine bark (bark pieces between $\frac{1}{2}$ and 2 inches in length)

1 part sterilized composted cow manure

3. Commercial fertilizer as recommended in soil report

4. Lime as recommended in soil report.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - 1. Protect adjacent and adjoining areas from hydroseeding overspray.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply fertilizer directly to subgrade before loosening.
 - 2. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 3. Spread planting soil mix to a depth of 2 inches (50 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches (50 mm) of subgrade. Spread remainder of planting soil mix.
 - b. Reduce elevation of planting soil to allow for soil thickness of sod.

- C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least of 6 inches (150 mm) Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches (150 mm) of soil. Till soil to a homogeneous mixture of fine texture.
 - a. Apply fertilizer directly to surface soil before loosening.
 3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.
- E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Restore areas if eroded or otherwise disturbed after finish grading and before planting.

3.4 HYDROSEEDING

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with nonasphaltic tackifier.
 2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch at a minimum rate of 1500-lb/acre (15.3-kg/92.9 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.
 3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry application at a minimum rate of 500-lb/acre (5.1-kg/92.9 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing

rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb/acre (10.2 kg/92.9 sq. m).

3.5 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - 1. Lay sod across angle of slopes exceeding 1:3.
- C. Saturate sod with fine water spray within two hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.6 LAWN RENOVATION

- A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - 1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- D. Mow, dethatch, core aerate, and rake existing lawn.
- E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

- G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).
- H. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches (100 mm) of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- I. Apply seed and protect with straw mulch or sod as required for new lawns.
- J. Water newly planted areas and keep moist until new lawn is established.

3.7 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
- B. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.
- C. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period and remove after lawn is established.
- C. Remove erosion-control measures after grass establishment period.

END OF SECTION 32 9200

SECTION 32 9300 - LANDSCAPE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Trees.
 - 2. Shrubs.
 - 3. Ground cover.
- B. Related Sections include the following:
 - 1. Division 2 Section "Lawns" for installation of turf grass areas.
 - 2. Division 2 Section 'Irrigation' for installation of underground irrigation system.

1.3 DEFINITIONS

- A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.
- B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

- E. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.
- F. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including planting soil mix.
- B. Product Certificates: For each type of manufactured product, signed by product manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Qualification Data: For landscape Installer.
- D. Material Test Reports: For existing surface soil and imported topsoil.
- E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of exterior plants during a calendar year. Submit before expiration of required maintenance periods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when exterior planting is in progress.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

- C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity deleterious material; pH; and mineral and plant-nutrient content of topsoil.
 1. Report suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce a satisfactory topsoil.
 - D. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."
 - E. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.
 - F. Observation: Architect may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 1. Notify Architect of sources of planting materials 14 days in advance of delivery to site.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver exterior plants freshly dug.
 - B. Do not prune trees and shrubs before delivery, except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of exterior plants during delivery. Do not drop exterior plants during delivery.
 - C. Handle planting stock by root ball.

- D. Deliver exterior plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set exterior plants trees in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before time of planting.
 - 3. Water root systems of exterior plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 COORDINATION

- A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit.
- B. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns, unless otherwise acceptable to Architect.
 - 1. When planting trees and shrubs after lawns, protect lawn areas and promptly repair damage caused by planting operations.

1.8 WARRANTY

- A. Special Warranty: Warrant the following exterior plants, for the warranty period indicated, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, or incidents that are beyond Contractor's control.
 - 1. Warranty Period for Trees, Shrubs Ground Cover: One year from date of Substantial Completion.
 - 2. Remove dead exterior plants immediately. Replace immediately unless required to plant in the succeeding planting season.
 - 3. Replace exterior plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - 4. A limit of one replacement of each exterior plant will be required, except for losses or replacements due to failure to comply with requirements.

1.9 MAINTENANCE

- A. Trees Shrubs and Ground Cover: Maintain for the following maintenance period by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.
 - 1. Maintenance Period: 30 Days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Grade: Provide trees and shrubs of sizes and grades complying with ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.2 SHADE AND FLOWERING TREES

- A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.
 - 1. Provide balled and burlapped trees.
 - 2. Branching Height: One-third to one-half of tree height.
- B. Small Upright or Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single stem or Multistem, clump, with three or more main stems.
 2. Provide balled and burlapped trees.
- C. Multistem Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:
1. Stem Form: Clump.
 2. Provide balled and burlapped trees.
- 2.3 DECIDUOUS SHRUBS
- A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
1. Provide container-grown trees.
- 2.4 CONIFEROUS EVERGREENS
- A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
- B. Form and Size: Specimen-quality, exceptionally heavy, tightly knit, symmetrically shaped coniferous evergreens and the following grade:
1. Heavy Grade: "XXX."
 2. Provide balled and burlapped trees.
- 2.5 BROADLEAF EVERGREENS
- A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.
1. Provide balled and burlapped trees.
- 2.6 GROUND COVER PLANTS
- A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

2.7 PERENNIALS

- A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed.
- B. Fast-Growing Vines: Provide vines of species indicated complying with requirements in ANSI Z60.1 as follows:
 - 1. Two-year plants with heavy, well-branched tops, with not less than 3 runners 18 inches (450 mm) or more in length, and with a vigorous well-developed root system.
 - 2. Provide field-grown vines. Vines grown in pots or other containers of adequate size and acclimated to outside conditions will also be acceptable.

2.8 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 10 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.
 - 1. Topsoil Source: Amend existing in-place surface soil to produce topsoil. Verify suitability of surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - a. Surface soil may be supplemented with imported or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2.9 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: Class T, with a minimum 99 percent passing through No. 8 (2.36-mm) sieve and a minimum 75 percent passing through No. 60 (0.25-mm) sieve.
 - 2. Provide lime in form of dolomitic limestone.
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 (3.35-mm) sieve and a maximum 10 percent passing through No. 40 (0.425-mm) sieve.

- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Finely ground, containing a minimum of 90 percent calcium sulfate.
- G. Sand: Clean, washed, natural or manufactured, free of toxic materials.
- H. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.10 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 3/4-inch (19-mm) sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - 1. Organic Matter Content: 50 to 60 percent of dry weight.
 - 2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
- B. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range of 3.4 to 4.8.
- C. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - 1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate

per cubic foot (cubic meter) of loose sawdust or ground bark.

- E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.11 FERTILIZER

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
- C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
- D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.12 MULCHES

- A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Pine straw.

2.13 STAKES AND GUYS

- A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches (50 by 50 mm) by length indicated, pointed at one end.

- B. Guy and Tie Wire: ASTM A 641/A 641M, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch (2.7 mm) in diameter.
- C. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch (13 mm) in diameter, black, cut to lengths required to protect tree trunks from damage.
- D. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

2.14 MISCELLANEOUS PRODUCTS

- A. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

2.15 PLANTING SOIL MIX

- A. Planting Soil Mix: Mix topsoil with the following soil amendments and fertilizers in the following quantities:
 - 1. 60% Topsoil as specified.
 - 2. 40% prepared additives (by volume as follows):
 - 2 parts humus and/ or peat
 - 1 part shredded pine bark (bark pieces between 1/2 and 2 inches in length)
 - 1 part sterilized composted cow manure
 - 3. Commercial fertilizer as recommended in soil report
 - 4. Lime as recommended in soil report.
- B. Planting Soil Mix for Annual Color and Perennial Plantings:: Mix topsoil with the following soil amendments and fertilizers in the following quantities:
 - 1. 40% Topsoil as specified.
 - 2. 25% humus
 - 3. 15% pine bark mulch (fingernail size chips)
 - 4. 10% "Natures Helper"
 - 5. 5% sterilized composted cow manure
 - 6. 5% angular builders sand (decrease amount if topsoil has a high percentage of sand)
 - 7. Lime at a rate of 5 lbs. per 50 sq ft of bed area (adjust for alkaline soils)

3.1 EXAMINATION

- A. Examine areas to receive exterior plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple exterior plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before planting. Make minor adjustments as required.
- D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

3.3 PLANTING BED ESTABLISHMENT

- A. Loosen subgrade of planting beds to a minimum depth of 8 inches (200 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 1. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 2. Spread planting soil mix to a depth of 8 inches (200 mm) but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

- a. Spread approximately one-half the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil mix.
- B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Restore planting beds if eroded or otherwise disturbed after finish grading and before planting.

3.4 TREE AND SHRUB EXCAVATION

- A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.
 1. Excavate approximately two times as wide as ball diameter for balled and burlapped and container-grown stock.
- B. Subsoil removed from excavations may not be used as backfill.
- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE AND SHRUB PLANTING

- A. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball 1 inch (25 mm) above adjacent finish grades.
 1. Remove burlap and wire baskets from tops of root balls and partially from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use

- planting stock if root ball is cracked or broken before or during planting operation.
2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- B. Set container-grown stock plumb and in center of pit or trench with top of root ball 1 inch (25 mm) above adjacent finish grades.
1. Carefully remove root ball from container without damaging root ball or plant.
 2. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
- C. Organic Mulching: Apply 3-inch (75-mm) average thickness of organic mulch extending 12 inches (300 mm) beyond edge of planting pit or trench. Do not place mulch within 1 inch of trunks or stems.
- 3.6 TREE AND SHRUB PRUNING
- A. Prune, thin, and shape trees and shrubs as directed by Architect.
 - B. Prune, thin, and shape trees and shrubs according to standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are sizes after pruning.
- 3.7 GUYING AND STAKING
- A. Guying and Staking: Guy and stake trees exceeding 10 feet in height and more than 2 inches in caliper, unless otherwise indicated. Securely attach no fewer than 3 guys to stakes 30 inches (760 mm) long, driven to grade.
 1. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.

3.8 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover as indicated.
- B. Dig holes large enough to allow spreading of roots, and backfill with planting soil.
- C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- E. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING BED MULCHING

- A. Mulch backfilled surfaces of planting beds and other areas indicated.
 - 1. Organic Mulch: Apply 3-inch (75-mm) average thickness of organic mulch, and finish level with adjacent finish grades. Do not place mulch against plant stems.

3.10 CLEANUP AND PROTECTION

- A. During exterior planting, keep adjacent pavings and construction clean and work area in an orderly condition.
- B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

3.11 DISPOSAL

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 32 9300

SECTION 32 9643 - TREE TRANSPLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the temporary relocation, storage, protection, irrigation and permanent transplanting of existing trees within the property.
- B. Related Sections include the following:
 - 1. Division 1 Section "Alternates" for tree transplanting work.
 - 2. Division 32 Section "Landscape" for tree and shrub planting, tree support systems, and soil materials and preparation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Relocation Schedule: Written schedule from tree transplanting firm detailing scope and extent of relocation operation.
- C. Qualification Data: For tree transplanting firm and arborist.
- D. Maintenance Recommendations: From arborist, for care and protection of relocated trees.

1.4 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed tree transplanting work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of tree relocation operation.

- B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Before tree relocation operations begin, meet with representatives of authorities having jurisdiction, Owner, Architect, consultants, and other concerned entities to review tree transplanting procedures and responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Mesh Fence: Plastic laminate fence material. 4 foot height minimum. Wood stakes located per tree protection detail shown on plans.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Project owner will identify an area within the Wolf Creek property to act as the holding area for transplanted trees during the construction period.
- B. Locate all above and below grade utilities and obstructions prior to beginning any excavation. Notify owner of potential conflicts prior to beginning tree transplanting operation.
- C. Temporary Fencing: Install temporary fencing around tree storage zones to protect trees from construction damage. Maintain temporary fence and remove when construction is complete.
 - 1. Install plastic laminate fence according to manufacturer's written instructions. Color: Orange.
- D. Mulch areas inside tree holding area.
 - 1. Apply 2-inch thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.

3.2 EXCAVATION

- A. Remove existing soil as necessary to set relocated tree rootballs flush with surrounding grade.

3.3 STORAGE

- A. Protect trees and tree root systems from damage during storage period.
- B. Monitor and maintain adequate water moisture on tree root balls throughout holding period. Water source to be provided by owner from on site sources. Water transportation and application to be provided as part of tree transplanting operation.

3.4 PERMENANT RELOCATION

- A. Upon establishment of finish elevations by others, relocate stored trees to locations shown on landscape plans. Coordinate operation with landscape contractor. Soil preparation around relocated trees to be provided by the landscape contractor. See Section 32 9300.

3.5 TREE PRUNING

- A. Upon permanent relocation, prune trees to remove any branches that are damaged by transplanting operation.
- B. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
- C. Cut branches with sharp pruning instruments; do not break or chop.

END OF SECTION 32 9643

SECTION 33 4600

FOUNDATION DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY:

- A. Work described in this section includes gravel or crushed stone bedding, fabric membrane material and drainage piping for foundation drainage systems.
- B. Related work specified elsewhere:
 - 1. Earthwork.
 - 2. Site drainage.
 - 3. Self-adhering sheet waterproofing.

1.2 SUBMITTALS:

- A. Product data: Submit for piping material and siltation fabric. Indicate compliance with specifications and piping installation instructions.

1.3 QUALITY ASSURANCE:

- A. Applicable standards:
 - 1. ASTM International (ASTM), standards as referenced herein.
 - 2. Georgia Department of Transportation, "GADOT Standard Specifications for Construction of Transportation Systems", 2003 Edition, hereinafter referred to as GADOT Specifications.
- B. At highest point in drainage system, invert of pipe shall not be higher than floor elevation.

1.4 PROJECT/SITE CONDITIONS:

- A. Verify grades, lines and elevations, and lay out grade stakes for drainage system. If grades are at variance with drawings, notify Architect and receive instructions prior to proceeding.
- B. Protection:
 - 1. Protect bench marks and monuments; if disturbed or destroyed, replace in original position.
 - 2. Prevent ponding or washing of water on site and on adjacent property.
 - 3. Coordinate placement of drainage components with earthwork and waterproofing operations.

PART 2 - PRODUCTS

2.1 DRAINAGE PIPE:

- A. PVC pipe and fittings: Comply with ASTM D2729-03 unperforated and perforated, 4" diameter.

2.2 GRAVEL OR CRUSHED STONE BEDDING:

- A. Material: Gravel or crushed stone meeting ASTM C33-03 or GADOT Specifications, Section 800 containing not more than 10 percent of material that passes through a No. 4 sieve.

2.3 FILTER MEMBRANE MATERIAL:

- A. Acceptable products:
1. Propex, Inc., Geotex 401.
 2. Triumph Geo-Synthetics, Inc., TC MiraDRI, 140NC.
 3. Reemay, Inc., Typar 3401 Geotextile Fabric.
- B. Characteristics:
1. Type: Non-woven, synthetic polyester, nylon or polypropylene geotextile membrane material.
 2. Apparent opening size (AOS): 70 to 120 U. S. Standard sieve when tested in accord with ASTM D4751-04.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Inspect pipe and fittings prior to placement. Install no damaged or defective pipe products.

3.2 PREPARATION:

- A. Excavation, filling and compaction for foundation drainage system shall be in accord with Earthwork section.
- B. Prepare drainage beds with allowance for gravel or crushed stone bedding, and cover to depth indicated.

3.3 DRAINAGE SYSTEM INSTALLATION:

- A. Lay filter membrane material in areas of excavation to receive perforated drainage pipe at foundations. Install filter membrane material in widths to wrap around gravel or crushed stone bedding, overlapping at top a minimum of 1'-0". Overlap ends of fabric in direction of drainage a minimum of 2'-0".
- B. Place and compact gravel or crushed stone bedding to a minimum depth of 2", providing positive drainage slope and smooth bedding surface for perforated drainage pipe. Provide thickness such that drain bottom is not higher than bottom of base under floor, and that top of drain is not less than 6" above top of footing.
- C. Install pipe drainage system in accord with ASTM D2321-05.
1. Install perforated pipe in all areas of drainage of foundations.
 - a. Install pipe drainage system using fittings recommended by pipe manufacturer's product data.
 - b. Orient perforated pipe with perforations in lower quadrant, but not directly at pipe invert.

- c. Install solid pipe from drainage area to point of discharge.
 2. Beginning at low point of drainage system, lay pipe with joints lapped upgrade. Lay in alignment, supported on gravel or crushed stone.
 3. Stake and wire or support drainage system with additional gravel or crushed stone to prevent displacement of pipe during backfill.
 4. Protect top of joints or top of perforations with filter membrane material.
 5. Cap buried ends of pipe.
 6. Maintain positive drainage slope.
- D. Notify Architect for inspection of drainage system prior to concealment of pipe with fill.
- E. Cover top of drain with filter membrane material. Cover drainage pipe with minimum 6" of gravel or crushed stone bedding taking care not to disturb pipe alignment. Cover gravel or crushed stone bedding with filter membrane material prior to placing earth backfill, overlapping 1'-0" and ends 2'-0" in direction of drainage.
- F. Place and compact earth fill over solid pipe leaders.
- G. Discharge drainage system at grade. Extend drain a minimum of 1'-0" beyond outside edge of footing, unless indicated otherwise on drawings. Protect end of discharge pipe by encasing in concrete drainage structure and terminating with rodent-proof grille.

End of Section