S.L. Nusbaum Realty Co.

Riverbend Apartments

6130 George Washington Highway
Gloucester, VA 23061

HUD Project No.:
TS3 Project No.: TS316075.00

Design Architect:

Civil Engineer:

Owner:

Mortgage Company:

Contractor:

Bonding Company:

JPS REVIEW SPECIFICATIONS

December 15, 2017

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SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

B. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

C. Section 02 41 00 - Demolition: Removal of built elements and utilities.

D. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

E. Section 32 93 00 - Plants: Relocation of existing trees, shrubs, and other plants.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation removal limits.
   2. Areas for temporary construction and field offices.

1.04 QUALITY ASSURANCE

A. Clearing Firm: Company specializing in the type of work required.
   1. Minimum of 1 years of documented experience.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 70 00.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not begin clearing until vegetation to be relocated has been removed.

C. Do not remove or damage vegetation beyond the limits indicated on drawings.

D. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.

2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
3. Around other vegetation to remain within vegetation removal limits.
4. See Section 01 50 00 for fence construction requirements.

E. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

F. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

G. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

H. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 31 22 00 - GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site improvements.

C. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 10 00 - Site Clearing.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching: Trenching and backfilling for utilities.

D. Section 31 23 23 - Fill: Filling and compaction.

E. Section 32 93 23 - Sodding.

F. Section 32 91 00 - Plant Materials and Planting.

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with HRPDC Regional Construction Standards, 6th Ed.
   1. Maintain one copy on site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Conforming to HRPDC Regional Construction Standards, 6th Ed.

B. Other Fill Materials: See Section 31 23 23.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, curbs, and trees to remain, from damage by grading equipment and vehicular traffic.

F. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

G. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. See Section 31 23 23 for filling procedures.

G. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.

H. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.04 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site; remove remainder from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 15 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

E. Place topsoil in areas where seeding, sodding, and planting are indicated.

F. Place topsoil where required to level finish grade.

G. Place topsoil to thickness as indicated.

H. Place topsoil during dry weather.

I. Remove roots, weeds, rocks, and foreign material while spreading.

J. Near plants and buildings spread topsoil manually to prevent damage.

K. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

L. Lightly compact placed topsoil.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch) from required elevation.

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Trees to Remain: If damaged due to this work, trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.

C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

A. See Section 31 23 23 for compaction density testing.

3.09 CLEANING

A. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 23 16 - EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, site structures, utilities within the building, and stormwater management facilities.

1.02 RELATED REQUIREMENTS

A. Section 00 91 14: Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 31 22 00 - Grading: Soil removal from surface of site.

C. Section 31 22 00 - Grading: Grading.

D. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

1.04 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 22 00 for additional requirements.

3.03 EXCAVATING

A. Underpin adjacent structures that could be damaged by excavating work.

B. Excavate to accommodate new structures, construction operations, and site improvements.

C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose matter.

H. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.

I. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.

J. Grade top perimeter of excavation to prevent surface water from draining into excavation.

K. Remove excavated material that is unsuitable for re-use from site.

L. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 22 00.

M. Remove excess excavated material from site.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 23 16.13 - TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building.

1.02 RELATED REQUIREMENTS

A. Section 00 91 14: Geotechnical report; bore hole locations and findings of subsurface materials.

B. Section 31 22 00 - Grading: Site grading.

C. Section 31 23 16 - Excavation: Building and foundation excavating.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 6 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.04 REFERENCE STANDARDS

A. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.

B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

C. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

D. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

E. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2015.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Samples: 10 lb sample of each type of fill; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Conforming to HRPDC Regional Construction Standards, 6th Edition.

B. General Fill: Subsoil excavated on-site.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Conforming to ASTM D2487 Group Symbol CL.

C. Structural Fill: Conforming to HRPDC Regional Construction Standards, 6th Edition.

D. Concrete for Fill: Lean concrete.

E. Granular Fill: Conforming to HRPDC Regional Construction Standards, 6th Edition.

F. Topsoil: Conforming to HRPDC Regional Construction Standards, 6th Edition.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 22 00 for additional requirements.

3.03 TRENCHING

A. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.

H. Remove excavated material that is unsuitable for re-use from site.

I. Stockpile excavated material to be re-used in area designated on site.

J. Remove excess excavated material from site.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.
   1. Thrust bearing surfaces: Fill with concrete.
   2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, sidewalks, and similar construction: 95 percent of maximum dry density.
   2. At other locations: 90 percent of maximum dry density.

K. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Utility Piping, Conduits, and Duct Bank:
   1. Bedding: Use general fill.
   2. Cover with general fill.
   3. Fill up to subgrade elevation.
   4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

C. At Pipe Culverts:
   1. Bedding: Use general fill.
   2. Place filter fabric specified in Section 33 05 13 over compacted bedding.
   3. Cover with general fill.
   4. Fill up to subgrade elevation.
   5. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

3.07 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556/D1556M, ASTM D2167, or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.09 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 11 23 - AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Paving aggregates.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Preparation of site for base course.

B. Section 31 23 16.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 32 12 16 - Asphalt Paving: Finish and binder asphalt courses.

D. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

E. Section 32 14 13 - Concrete Pavers.

F. Section 32 17 13 - Parking Bumpers: Concrete bumpers.

G. Section 33 05 13 - Manholes and Structures: Manholes including frames.

1.03 REFERENCE STANDARDS

A. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Samples: 10 lb sample of each type of aggregate; submit in air-tight containers to testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where stockpiles are not obstructing construction sequence.

C. Aggregate Storage, General:
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate: Coarse aggregate, conforming to State of Virginia Highway Department standard.

B. Fine Aggregate: Sand; conforming to State of Virginia Highway Department standard.

C. Geotextile Fabric: Non-biodegradable, woven manufactured by Mirafi.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Spread aggregate over prepared substrate to a total compacted thickness consistent with pavement sections shown on plans.

B. Place aggregate in maximum 4 inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted aggregate base course in accordance with HRPDC Regional Construction Standards, 6th Edition.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: as required by HRPDC Regional Construction Standards, 6th Edition.

F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade, pavers, and paving.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Single course bituminous concrete paving.

C. Double course bituminous concrete paving.

D. Surface sealer.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Preparation of site for paving .

B. Section 32 11 23 - Aggregate Base Courses: Aggregate base course.

C. Section 32 13 13 - Concrete Paving: Concrete curbs.

D. Section 32 17 13 - Parking Bumpers: Concrete bumpers.

E. Section 33 05 13 - Manholes and Structures: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 REFERENCE STANDARDS

A. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Virginia Highways standard.

B. Mixing Plant: Conform to State of Virginia Highways standard.

C. Obtain materials from same source throughout.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

1.06 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Place bitumen mixture when temperature is not more than 15 F degrees below bitumen supplier's bill of lading and not more than maximum specified temperature.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: In accordance with State of Virginia Highways standards.

B. Aggregate for Base Course: In accordance with State of Virginia Highways standards.

C. Aggregate for Binder Course: In accordance with State of Virginia Highways standards.

D. Aggregate for Wearing Course: In accordance with State of Virginia Highways standards.

E. Fine Aggregate: In accordance with State of Virginia Highways standards.

F. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.

G. Primer: In accordance with State of Virginia Highways standards.

H. Tack Coat: In accordance with State of Virginia Highways standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 BASE COURSE

A. See Section 32 11 23.

3.03 PREPARATION - PRIMER

A. Apply primer in accordance with State of Virginia Highways standards.

B. Apply primer on aggregate base or subbase at uniform rate of 1/3 gal/sq yd.

C. Apply primer to contact surfaces of curbs, gutters, and walks.

D. Use clean sand to blot excess primer.

3.04 PREPARATION - TACK COAT

A. Apply tack coat in accordance with State of Virginia Highways standards.

B. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/3 gal/sq yd.

C. Apply tack coat to contact surfaces of curbs, gutters and walks.

D. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.05 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with State of Virginia Highways standards.

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Place to thickness identified in pavement sections shown on plans.

D. Install drainage inlet frames and manhole frames in correct position and elevation.

E. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

F. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.06 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer coat.

B. Place binder course to thickness identified in pavement sections shown on plans.

C. Place wearing course within 24 hours of applying tack coat on binder course.

D. Place wearing course to thickness identified in pavement sections shown on plans.

E. Install drainage inlet frames and manhole frames in correct position and elevation.

F. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

G. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.07 CURBS

A. Install extruded asphalt curbs of design profile as indicated.

3.08 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.

C. Variation from True Elevation: Within 1/4 inch.

3.09 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for quality control.

B. Provide field inspection and testing. Take samples and perform tests in accordance with State of Virginia Highways Standards.

3.10 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury for 2 days or until surface temperature is less than 100 degrees F.

END OF SECTION

SECTION 32 13 13 - CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs, gutters, and parking areas.

1.02 RELATED REQUIREMENTS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 31 22 00 - Grading: Preparation of site for paving.

D. Section 32 12 16 - Asphalt Paving: Asphalt wearing course.

E. Section 32 17 13 - Parking Bumpers: Precast concrete parking bumpers.

F. Section 32 17 26 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

G. Section 33 05 13 - Manholes and Structures: Manholes, including frames; gutter drainage grilles, covers, and frames for placement by this section.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 305R - Hot Weather Concreting; 2010.

D. ACI 306R - Cold Weather Concreting; 2010.

E. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

F. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

G. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

H. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.

I. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

J. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on joint filler, admixtures, curing compound, and concrete mix design.

C. Samples: Submit two sample panels, 12 by 12 inch in size illustrating exposed aggregate finish.

D. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of State of Virginia Highways standard.

B. Concrete Sidewalks, Curbs and Gutters: 3,000 psi 28 day concrete, buff color Portland cement, exposed aggregate finish.

C. Parking Area Pavement: 3,000 psi 28 day concrete, wood float finish.

2.02 FORM MATERIALS

A. Wood form material, profiled to suit conditions.

B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
   1. Thickness: 1/2 inch.

2.03 REINFORCEMENT

A. Reinforcing Steel and Welded Wire Reinforcement: Types specified in Section 03 20 00.

B. Reinforcing Steel and Welded Wire Reinforcement: Types specified on plans.

2.04 CONCRETE MATERIALS

A. Obtain cementitious materials from same source throughout.

B. Concrete Materials: Provide in accordance with State of Virginia Highways standards.

C. Air-Entraining Admixtures: ASTM C260/C260M.

2.05 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of tested mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

D. Fiber Reinforcement: Add to mix as recommended by manufacturer for specific project conditions.

E. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; As indicated on drawings.

2.06 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. See Section 32 11 23 for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

C. Notify Architect minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement at midheight of slabs-on-grade.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI 305R when concreting during hot weather.

B. Follow recommendations of ACI 306R when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Coordinate installation of snow melting components.

B. Place concrete in accordance with State of Virginia Highways standards.

C. Do not place concrete when base surface is wet.

D. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

F. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.08 JOINTS

A. Align curb, gutter, and sidewalk joints.

B. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components.
   1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
   2. Secure to resist movement by wet concrete.

C. Provide scored joints.
   1. At 4 feet intervals.
   2. Between sidewalks and curbs.
   3. Between curbs and pavement.

D. Provide keyed joints as indicated.

E. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.09 EXPOSED AGGREGATE

A. Wash scheduled concrete surfaces exposing aggregate to match sample panel.

3.10 FINISHING

A. Parking Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge.

C. Curbs and Gutters: Light broom, texture parallel to pavement direction.

D. Inclined Vehicular Ramps: Broomed perpendicular to slope.

E. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.11 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.12 FIELD QUALITY CONTROL

A. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
   1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
   2. Perform one slump test for each set of test cylinders taken.

B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.13 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian, vehicular, or construction traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 32 13 13 – CONCRETE POOL DECK

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide labor, equipment and materials to construct the pavement base course and colored and exposed aggregate paving as indicated on the drawings.

1.02 RELATED WORK

A. Section 31 00 00 - EARTHWORK

B. Section 13 11 13 - SWIMMING POOL

C. Section 32 13 19- ORNAMETAL PICKET FENCING

1.03 QUALITY ASSURANCE

A. All methods and materials shall conform to the applicable sections of the Virginia Department of Transportation (VDOT) Road and Bridge Specifications dated January, 1994 and Standards dated 1993, or current addition.

B. Provide strength testing of cured concrete as per ACI standards. Testing shall be accomplished by a state certified concrete testing lab.

1.04 SUBMITTALS

A. Test Reports, Material Certifications: Submit following reports directly to Landscape Architect.

1. Certifications of job - mix formula for each source of aggregate material, and hydraulic cement concrete.

2. Test results from concrete testing lab certifying that concrete paving has attained design strength.

B. Materials for concrete paving:

1. Self-leveling joint sealant
2. Matt finish concrete sealer for paving surfaces
3. Manufacturer’s literature on deck drains

C. Provide 4' x 6' sample panel which indicate expansion joint, saw cut and concrete finish.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Course: Type I, size 21, 21A or 26 in accordance with Section 209, VDOT Road and Bridge Spec. Other grades as specified shall comply with VDOT specifications when shown on plans.

B. Concrete: In accordance with ACI 318, sampling - ASTM C172, slump - ASTM C143, air

content - ASTM C173. 3,500 psi. Minimum.

C. Drainage gravel. VDOT #57 when shown on plans.

D. Backer rod closed cell type 'SonoFoam' brand by 'Sonneborn Building Products' 404-355-6767.

E. Joint Sealant - 'Paving Joint Sealant' and '2 Parts Polysulfide' brand sealant as manufactured by 'Sonneborn Building Products'. '2 Parts Polysulfide' to be used where joint is in contact with pool water. Color as selected by landscape architect.

F. Joint Filler - 'Sonoflex 'F'' brand Joint Filler by 'Sonneborn Building Products'.

G. Matt finish clear , spray-on sealer for paving surfaces as selected by paving installer.

H. Bronze finish deck drain shall be Model #2270-04-T-U-B-NB by Jay R. Smith Manufacturing, 2781 Gunter Park Dr, East, Montgomery, AL 36109-0237 (334) - 277-8520.

PART 3 EXECUTION

3.01 PAVEMENT

A. Subgrade - Compact to 95% standard proctor density and compressive strength - ASTM C39.

1. Prior to installation of aggregate base course and pavement, the subgrade CBR values shall be verified as specified on plans. Contractor shall not proceed with further work without approval of Landscape Architect.

B. If aggregate base course is not constructed immediately after subgrade has been prepared, compacted, and approved by Landscape Architect, and subgrade becomes cut-up or rough, scarify a minimum of 8 inches depth, mix, reshape, and recompact to 95% of maximum density.

C. Construct aggregate base course of thickness indicated in accordance with Section 309, VDOT Road and Bridge Specifications.

D. Construct concrete pavement of thickness indicated on the plans in accordance with Section 321, VDOT Road and Bridge Specifications except specimen beams shall not be required.

3.02 CONCRETE SIDEWALKS AND POOL PATIO

A. Concrete walks and pool deck shall be constructed of concrete to the width indicated and shall be 4 to 6 inches thick as shown on drawings.

B. Round edges, including expansion joints and grooves, with steel finishing tool.

C. Forms shall remain in place twenty-four (24) hours. Protect walks from traffic for three (3) days after placing.

D. Contractor shall comply with ACI standards for concreting in cold and hot weather.

E. Joints and Grooves: Provide joints and grooves at locations indicated on the plans and in accordance with the following:

1. Provide expansion joints spaced not more than 40 ft. max. apart both ways and where

sidewalks and pool deck abut walls, curbs, steps or other structures when not indicated. Plans shall govern when indicated. Discontinue reinforcing at expansion joints.

2. Match joints in curbs when not indicated. Plans shall govern when indicated.

3. Cut transverse grooves 1/8 inch wide and 1 1/2 inch deep at 5 foot maximum both ways or as shown on the plans; plans shall govern.

F. Cut transverse crack control grooves 1/8 inch wide and 2 1/2 inch deep at 20 foot maximum both ways. Discontinue reinforcing at joint

G. Finish: All panels shall have consistent color and texture.

H. Where walks terminate at curbs, finish 1/4 inch above curb and bevel.

I. Upon finishing of paving installation, seal all concrete, colored and exposed aggregate concrete with one coat of matt finish clear concrete sealer. Install as per manufacturer's installation instructions.

J. Ground and bond rebar and metal drains in concrete pool deck as per local codes and National Electrical Code (NEC).

K. Crack control joints shall be sawn in paving with motorized, walk behind, water cooled, self-propelled commercial concrete cutting equipment. Use of a quickie saw or quickie saw on a stand is not acceptable. Concrete saw cutting shall be accomplished at proper time to reduce and prevent concrete thermal shrinkage cracking in the surface of the concrete.

3.03 QUALITY CONTROL OF CONCRETE SIDEWALKS AND PATIO

A. Concrete paving shall be installed as per the highest finish standards in the industry. Concrete will be rejected if the following standards are not met:

1. Concrete shall be consistent in color.
2. Concrete shall be consistent in texture.
3 Broom finish shall be of consistent texture and in consistent smooth direction.
4. Sawn control joints shall be cut in a straight line and shall not vary 1/4" in 5'-0" length.
5. Sawn control joints shall be void of chipped edges or divots created from the sawing process.
6. Adjacent paving panels shall not vary 3/16" in height between panels, expansion joints or control joint.
7. Edges of adjacent paving panels at expansion joints shall not vary 3/16" in height between panels.
8. Widths of expansion joints and caulk joints shall be of consistent width and shall not vary 1/8" in 5'-0".
9. Corners at expansion joints and sawn control joints shall be square and sound and shall not be rounded, chipped or depressed.
10. Rounded edges at expansion joint shall be of consistent radius and should be of proper height to prevent collection of water.
11. Concrete paving at coping shall be level with back edge of coping and shall not project above brick coping at concrete intersection.
12. Concrete around skimmer tops shall be of similar color and texture to the pool deck.
13. Concrete panels with improper design strength.
14. Concrete which has set up too quickly and has improper surface texture or appearance.
15. Concrete panels which have bird bath depressions, or areas that collect water.
16. Finished concrete work shall be devoid of chalk marks and markings.

END OF SECTION

SECTION 32 13 19 - ORNAMENTAL PICKET FENCING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 RELATED WORK

A. Section 04 21 11 and 04 21 13 - Unit Masonry Assembly
B. Section 31 00 00 - Earthwork
C. Section 32 91 00 - Plant Material and Planting
D. Section 32 93 23 - Sodding

1.03 SUMMARY

A. This Section includes the following:

1. Ornamental picket fence, posts, and accessories.

1.04 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data in the form of manufacturer's technical data, specifications, samples and installation instructions for fencing, posts, and accessories.

2. Shop drawings showing location of fences, each post, and details of post installation, hardware, and accessories.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain ornamental picket fences as complete units, including necessary erection accessories, fittings, and fastenings from a single source or manufacturer unless indicated on plans.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Elite Fencing Products

B. Architectural Metal Works

C. Monumental Iron Works

D. Braun, J.G.

E. Crane Veyor

F. Livers Bronze

G. Newman Brothers

H. Pisor

I. Superior Aluminum

J. Wylie

2.02 FENCE TYPE

Fence Type: Custom fence heights and styles as per drawings.

2.03 ORNAMENTAL PICKET FENCE

A. Pickets: Square tubular members, ASTM A 513, hot- rolled structural quality steel, 45,000 psi (310 MPa) tensile strength, with ASTM A 525 hot-dipped galvanized G90 coating. Minimum size of 1 inch, 16 gage. Space pickets 4 inches face to face. Attach each picket to rails with 1/4 inch industrial drive rivets.

B. Rails: "U" channels formed form hot rolled, structural steel, 1 3/8 inches wide x 1 1/2 inches deep, 11 gage, 0.120 inch wall thickness. Punch rails to receive pickets and attach to rail brackets with industrial drive rivets. Each fence panel shall have 3 rails as indicated by fence style.

C. Posts: Square tubular members, ASTM A 500, hot-rolled structural quality steel, 45,000 psi (310 MPa) tensile strength, with ASTM A 525 hot-dipped galvanized G90 coating. Line posts, minimum size of 2 ½" square, corner posts, gate post and decorative posts, minimum size 4" square, 12 gage wall thickness, 4.286 lb/ft.

D. Accessories: Preassemble panels with ornamental accessories attached with industrial drive rivets to prevent removal and vandalism.

E. Finish: After components have ben galvanized to provide maximum corrosion resistance, pretreat, clean, and prepare galvanized surface to assure complete adhesion of finish coat. Apply 2.5 mil thickness of polyester resin based powder coating by electrostatic spray process. Bake finish for 20 minutes at 450 degrees F, metal temperature. Color: color as per drawings

F. Post anchor on parking deck shall be bolt down flange and bolts as designed by manufacturer.

G. Fence color -

1. Pool fence = Grey, Tan, or Black as selected by Landscape Architect

2.04 FITTINGS AND ACCESSORIES

A. Rail attachment brackets: Cast malleable iron, ASTM A47, Grade 32510, galvanized in accordance with ASTM B 695.

B. Industrial drive rivets: #MIW 381080691.

C. Post caps: Formed steel, weathertight closure cap. Provide one post cap for each post as per drawings.

D. Picket tops: Provide polymer plug, clear, for each picket.

E. All accessories shall be color coated to match fence color.

PART 3 EXECUTION

3.01 INSTALLATION

A. Verify areas to receive fencing are completed to final grades and elevations.

B. Ensure property lines and legal boundaries of work are clearly established.

3.02 ORNAMENTAL PICKET FENCE INSTALLATION

A. Install fence in accordance with manufacturer's instructions.

B. Space posts uniformly at 7 feet 10 1/2 inches maximum face to face, unless otherwise indicated.

C. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

D. Align fence panels between posts. Firmly attach rail bracket to posts with 1/4 inch bolt and lock nut, ensuring panels and posts remain plumb

E. Attach rail bracket to brick columns in accordance with manufacturer's instructions.

END OF SECTION

SECTION 32 14 13 - CONCRETE PAVERS

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide interlocking concrete unit paving as shown and specified. The work includes:

1. Prest interlocking concrete unit paving over a flexible base.
2. Edging (Mortar paver on reinforced concrete footing)

B. Related work:

1. Section 31 20 00- Earth Moving
2. Section 32 13 13- Concrete Paving Joint Sealants

1.02 QUALITY ASSURANCE

A. Comply with Section 01 40 00 quality requirements.

B. Installation: Performed only by skilled workmen with satisfactory record of performance on completed projects of comparable size and quality.

C. Sample panel: Before starting interlocking concrete unit paving, provide a sample panel using materials, patterns, and joints indicated for project work. Build panel at the site of full thickness and approximately 4' x 4'. Provide the range of color, texture, and workmanship, proposed for the work. Correct and rebuild sample panel until Landscape Architect's acceptance of the work. Retain panel during construction as a standard for completed paving work.

1. The approved sample panel may be a portion of the work and remain in place. Location as directed by the Landscape Architect.

2. Provide a sample panel for each type of interlocking concrete unit paving required.

1.03 SUBMITTALS

A. In accordance with section entitled "Shop Drawings, Product Data and Samples." Two samples of paving stones shall be submitted to the Landscape Architect to indicate colors to be supplied on this job. Colors to be selected from manufacturers available paving stone colors.

B. Submit manufacturer's product data and installation instructions for interlocking concrete paver units.

C. Submit manufacturer's certification that paver units comply with specified material and physicaL requirements.

D. Submit material certificates for base and bedding materials.

1.04 PRODUCT HANDLING

A. Paving stones shall be delivered and unloaded at jobsite in metal strapped cubes in such a manner that no damage occurs to the product during hauling, handling or unloading at the jobsite. Strapped cubes shall be raised off the ground and covered with plastic to prevent staining or contamination of paver.

B. Store loose granular materials in a well-drained area on a solid surface to prevent mixing with foreign materials.

1.05 PROJECT CONDITIONS

A. Review installation procedures and coordinate paving work with other work affected by the interlocking concrete unit paving work.

B. Cold weather:

1. Do not use frozen materials or materials mixed or coated with ice or frost.
2. Do not build on frozen work or wet, saturated or muddy subgrade. Remove and replace paving damaged by frost or freezing.

C. Protect partially completed paving against weather damage when work is not in progress.

D. Provide temporary barricades and warning lights as required for protection of project work and public safety.

E. Protect adjacent work from damage, soiling, or staining during paving operations.

PART 2 PRODUCTS

2.01 PRODUCT INFORMATION

A. All interlocking concrete paving stones shall conform to ASTM C-936-83 "Standard Specification for Solid Concrete Interlocking Paving Units." Pavers shall be concrete pavers by ‘Techobloc Pavers’. Sizes, colors and models, as per plans.

1. Pavers shall have a minimum compressive strength of 8,000 psi. and a maximum absorption of 5% when tested in accordance with ASTM C-140.
2. Materials used to manufacture interlocking concrete paving stones shall conform to the following:
   a. Cement-ASTM C-150 Portland Cement Type II
   b. Aggregates-ASTM C-33 (washed, graded sand and limestone, no expanded shale or lightweight aggregates) Colored aggregates as per selected sample.
   c. Custom colors, as per plans.

PART 3 EXECUTION

3.01 PAVER CONDITIONS

A. Pavers shall be free of foreign materials before installation. Pavers showing signs of efflorescence or bloom due to soil, water contamination or improper manufacturing shall be discarded.

3.02 INSTALLATION: BASE MATERIALS

A. Bedding and leveling course:

1. Obtain Landscape Architect's inspection and acceptance of finished base course before placing bedding, leveling course materials.

3.03 PAVER LAYOUT

A. Field measure all areas to receive pavers.

B. Installation should start from the center of each panel to the outer edges. Adjust paver courses to prevent coursing less than 4" wide at course parallel to concrete bands or edge.

3.04 PAVER INSTALLATION

A. Paving work shall be plumb, level and true to line and grade; shall be installed to properly coincide and align with adjacent work and elevations. (All edges must be restrained to secure the perimeter stones and the sand laying course. Provide walls, curbs or steel edging at exterior courses.)

B. Paving stones should be installed hand tight and level on the undisturbed sand laying course. String lines should be used to hold pattern lines true.

C. Where applicable, adjust overall nominal dimensions shown on plans to reduce cutting of pavers where they abut planting or lawn areas.

D. Where pavers abut existing pavement or concrete curbs, prepare the existing pavement as required to created a neat and consistent joint between the two paving materials. Chip or grind concrete as required. Maximum sand joint 1/8".

E. The completed paving stone installation should be cleaned and washed down to provide a finished workmanlike installation.

F. All surface utilities should be encased in concrete to set stones against.

G. Where abrupt grade changes occur in paving; bend, cut, file recess and/or weld metal edging as required to conceal metal edging below pavers.

H. Paver panels as shown are designed to eliminate cutting pavers at edges. Verify actual dimensions and report any variations to Landscape Architect. Paver coursing shall only be altered at the direction of the Landscape Architect.

I. Edging to be continuous around all edges of pavers.

3.05 PAVER CUTTING

A. Cutting of paving stones may be done with diamond tip masonry saw and/or lazer only. Paving stones to be cut with laser only in cul de sac. The cutting of the pavers on this project shall be made with a masonry saw as per manufacturer's recommendations.

3.06 SITE CONDITIONS

A. Paving contractor shall protect and be responsible for all finished surfaces surrounding his work, such as adjacent walls, window frames, glass, etc.

3.07 QUALITY

A. Quality workmanship shall be strictly high grade in accordance with best practices of the trades.

END OF SECTION

SECTION 32 17 13 - PARKING BUMPERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete parking bumpers and anchorage.

1.02 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

B. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide unit configuration, dimensions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Parking Bumpers: Precast concrete, conforming to the following:
   1. Nominal Size: 6 1/2 inches high, 9 inches wide, 8 feet long.
   2. Profile: Rectangular cross section with sloped vertical faces, square ends.
   3. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
   4. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
   5. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
   6. Air Entrainment Admixture: ASTM C260/C260M.
   7. Concrete Mix: Minimum 5,000 psi compressive strength after 28 days, air entrained to 5 to 7 percent.
   8. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
   9. Embed reinforcing steel, and drill or sleeve for two dowels.
   10. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
   11. Minor patching in plant is acceptable, providing appearance of units is not impaired.

B. Dowels: Steel, unfinished; 5/8 inch diameter, 24 inch long, pointed tip.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work.

C. Fasten units in place with 2 dowels per unit.

END OF SECTION

SECTION 32 17 23.13 - PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols, and curb markings.

B. Roadway lane markings and crosswalk markings.

C. "No Parking" curb painting.

1.02 RELATED REQUIREMENTS

A. Section 32 12 16 - Asphalt Paving.

B. Section 32 13 13 - Concrete Paving.

C. Section 32 17 26 - Tactile Warning Surfacing: Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.03 REFERENCE STANDARDS

A. FS TT-B-1325 - Beads (Glass Spheres); Retro-Reflective; Rev. D, 2007.

B. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne; Rev. E, 2007.

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

D. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment accompanied by batch certificate.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Roadway Markings: As required by authorities having jurisdiction.
   2. Parking Lots: White.
   3. Handicapped Symbols: Blue.
   4. Products: As approved by Virginia Highway Department.

B. Paint For Obliterating Existing Markings: FS TT-P-1952; black for bituminous pavements, gray for portland cement pavements.
   1. Products: As approved by Virginia Highway Department

C. Reflective Glass Beads: FS TT-B-1325, Type I (low index of refraction), Gradation A (coarse, drop-on); with silicone or other suitable waterproofing coating to ensure free flow.
   1. Products: As approved by Virginia Highway Department.

D. Temporary Marking Tape: Preformed, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

E. Tactile Warning Surfaces: See Section 32 17 26.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Obliteration of existing markings using paint is acceptable in lieu of removal; apply the black paint in as many coats as necessary to completely obliterate the existing markings.

D. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
   2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

G. Temporary Pavement Markings: When required or directed by Architect, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
   1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
   2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch, minimum.
   3. Length Tolerance: Plus or minus 3 inches.
   4. Width Tolerance: Plus or minus 1/8 inch.

G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner.

END OF SECTION

SECTION 32 17 26 - TACTILE WARNING SURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic tactile and detectable warning tiles for pedestrian walking surfaces.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for sidewalks and platforms.

B. Section 32 13 13 - Concrete Paving: Concrete sidewalks.

C. Section 32 17 23.13 - Painted Pavement Markings: Crosswalk and curb markings.

1.03 REFERENCE STANDARDS

A. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.

B. AASHTO LRFD - Bridge Design Specifications, Customary U.S. Units (7th Edition); 2016.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

E. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.

F. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 1984 (Reapproved 2015).

G. ASTM C903 - Standard Practice for Preparing Refractory Specimens by Cold Gunning; 2015.

H. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2011.

I. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.

J. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).

K. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.

L. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2010.

M. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.

N. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

O. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

P. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

Q. FED-STD-595C - Colors Used in Government Procurement (Fan Deck); 2008 (Chg Notice 1).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's product data, standard details, details specific to this project; written installation and maintenance instructions.

C. Samples: For each product specified provide two samples, 8 inches square, minimum; show actual product, color, and patterns.

D. Shop Drawings: Submit plan and detail drawings. Indicate:

1. Locations on project site. Demonstrate compliance with referenced accessibility standards.

2. Sizes and layout.
3. Pattern spacing and orientation.
4. Attachment and fastener details, if applicable

E. Warranty: Submit manufacturer warranty; complete forms in Owner's name and register with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years documented experience.

B. Installer Qualifications: Company certified in writing by product manufacturer as having successfully completed work substantially similar to the work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver to project site in manufacturer's protective wrapping and in manufacturer's unopened packaging.

B. Store covered and elevated above grade and in manufacturer's unopened packaging until ready for installation. Maintain at ambient temperature between 40 and 90 degrees F.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Plastic Tiles: Provide manufacturer's standard five year warranty against manufacturing defects, breakage or deformation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Tactile and Detectable Warning Surface Tiles:
1. Access Tile, a brand of Access Products, Inc: www.accesstile.com.
2. ADA Solutions, Inc: www.adatile.com/#sle.
3. Armor-Tile, a brand of Engineered Plastics, Inc: www.armortiletransit.com.

2.02 TACTILE AND DETECTABLE WARNING DEVICES

A. Plastic Tactile and Detectable Warning Tiles: ADA Standards compliant, glass fiber and carbon fiber reinforced, exterior grade, matte finish polyester sheet with truncated dome pattern, solid color throughout, internal reinforcing of sheet and of truncated domes, integral radius cut lines on back face of tile; with factory applied removable protective sheeting.
1. Material Properties:
a. Water Absorption: 0.20 percent, maximum, when tested in accordance with ASTM D570.
b. Slip Resistance: 0.50 minimum dry static coefficient of friction, when tested in accordance with ASTM D2047.
c. Compressive Strength: 25,000 pounds per square inch, minimum, when tested in accordance with ASTM D695.
d. Tensile Strength: 10,000 pounds per square inch, minimum, when tested in accordance with ASTM D638.
e. Flexural Strength: 25,000 pounds per square inch minimum, when tested in accordance with ASTM D790.
f. Chemical Stain Resistance: No reaction to 1 percent hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, or antifreeze, when tested in accordance with ASTM D543.
g. Abrasion Resistance: 300, minimum, when tested in accordance with ASTM C501.
h. Flame Spread Index: 25, maximum, when tested in accordance with ASTM E84.
i. Accelerated Weathering: Delta-E of less than 5.0 at 2,000 hours exposure, when tested in accordance with ASTM G155.

j. Adhesion: No delamination of tile prior to board failure in a temperature range of 20 to 180 degrees F, when tested in accordance with ASTM C903.
k. Loading: No damage when tested according to AASHTO LRFD test method HS20.
l. Salt and Spray Performance: No deterioration or other defect after 200 hours of exposure, when tested in accordance with ASTM B117.

2. Installation Method: Cast in place.
3. Shape: Rectangular.
4. Dimensions: 24 inches by 48 inches.
5. Pattern: In-line pattern of truncated domes complying with ADA Standards.
6. Edge: Square.
7. Joint: Butt.
8. Color: FED-STD-595C, Table IV, Federal Yellow No. 33538.

2.03 ACCESSORIES

A. Fasteners: ASTM A666, Type 304 stainless steel
1. Type: Countersunk, color matched composite sleeve anchors
2. Size: 1/4 inch diameter and 1-1/2 inches long.

B. Adhesive: Type recommended and approved by surfacing tile manufacturer.

C. Sealant: Elastomeric sealant of color to match adjacent surfaces; approved by surfacing tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. When installation location is near site boundary or property line, verify required location using property survey.

B. Verify that work area is ready to receive work:
1. Examine work area with installer present.
2. If existing conditions are not as required to properly complete the work of this section, notify Architect.
3. Do not proceed with installation until deficiencies in existing conditions have been corrected.

C. Verify that dimensions, tolerances, and attachment methods for work in this section are properly coordinated with other work on site.

3.02 INSTALLATION, GENERAL

A. Install in accordance with manufacturer's written instructions.
1. Do not install damaged, warped, bowed, dented, abraded, or otherwise defective units.
2. Do not install when ambient or substrate temperature has been below 40 degrees F during the preceding 8 daylight hours.

B. Field Adjustment:
1. Cut units to size and configuration shown on drawings.
2. Do not cut plastic tiles to less than 9 inches wide in any direction.
3. Locate relative to curb line in compliance with ATBCB PROWAG, Sections 304 and 305.
4. Orient so dome pattern is aligned with the direction of ramp.
5. Align truncated dome pattern between adjacent units.

C. Install units fully seated to substrate, square to straight edges and flat to required slope.

D. Align units so that tops of adjacent units are flush and joints between units are uniform in width.

3.03 INSTALLATION, CAST IN PLACE PLASTIC TILES

A. Concrete:
1. See Section 03 30 00.
2. Slump: 4 to 7 percent.

B. When installing multiple adjacent units, leave a 3/16 inch gap between units to allow for expansion.

C. Tamp and vibrate units as recommended by manufacturer.

D. Place and position weights on units while concrete cures as recommended by manufacturer. Ensure no voids or air pockets exist between top surface of concrete and underside of units.

3.04 CLEANING PLASTIC UNITS

A. Remove protective plastic sheeting within 24 hours of installation.

B. Remove excess sealant or adhesive from joints and edges.

C. Clean four days prior to date of scheduled inspection.

3.05 PROTECTION

A. Protect installed units from traffic, subsequent construction operations or other imposed loads until concrete is fully cured.

B. Touch-up, repair or replace damaged products prior to Date of Substantial Completion.

END OF SECTION

SECTION 32 18 16.13 - 'WOOD CARPET' REACTIVE PLAYING SURFACE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide labor, equipment and materials to install 'Wood Carpet' reactive playing surface.

B. Provide labor, equipment and materials to install wood edge.

1.02 RELATED WORK

A. Section 32 13 13 Concrete Paving

1.03 QUALITY ASSURANCE

A. All material components of the 'Wood Carpet' reactive playing surface shall be obtained from Zeager Bros., Inc.. or its' authorized distributors.

1.04 SUBMITTALS

A. Zeager Bros., Inc. shall submit samples of the 'Wood Carpet' Reactive Playing Surface.

1.05 ACCEPTABLE MANUFACTURERS

A. Zeager Bros. Inc., 4000 East Harrisburg Pike, Middletown, Pennsylvania 17057, (800) 346-8524.

B. Manufacturers of systems to be considered equal to 'Wood Carpet' reactive play surface shall be approved by the Owner in writing prior to the bid date.

PART 2 PRODUCTS

2.01 MATERIALS

A. 'WOODCARPET' will consist of North American Hardwoods such as Oak, Maple, Ash, Poplar, Hickory, Beech, Birch, Locust. All wood will have been debarked and free of soil, leaves and twig material and other contaminates which may otherwise hasten decomposition. No chemical treatments or additives will be used.

B. 4" diameter perforated pipe - 4" perforated pipe with 'ADS' Drain Sock as manufactured by ADS, Columbus, Ohio 43221, (614) 457-3051 or equal.

C. Soil separator-Polypropylene, soil separator - Model #'Mifari' 140N' as manufactured by Mirafi, Inc., Charlotte, NC 28224, (800) 438-1855, or equal.

D. 4" x 4" nom. pressure-treated southern yellow pine.

E. Geotextile board - Model '#9010' by 'Enkadrain' or equal.

F. Drainage gravel -VDOT #57

2.02 DIMENSIONS

A. WOODCARPET shall be randomly sized, and approximately ten times longer than wide. WOODCARPET shall meet the gradation requirements of ASTM C 136.----Ninety-eight percent (98%) of WOODCARPET dimensions shall not exceed 4.00 centimeters in length, 1.30 centimeters in width and 3.25 centimeters in depth.

2.03 PERMEABILITY

A. Moisture absorption of WOODCARPET shall be no greater than one hundred fifty percent (150%) by weight. Coefficient of permeability is greater than 0.6 cm/sec ASTM D 2434.

PART 3 EXECUTION

3.01 BASE

A. Subgrade- Compact to 95% standard proctor density and compressive strength- ASTM C39.

B. If aggregate base course is not constructed immediately after subgrade has been prepared, compacted and approved by Owner, and subgrade becomes cut-up or rough, scarify a minimum of 8 inched depth, mix, reshape, and recompact to 95% of maximum density.

C. Construct aggregate base course of thickness indicated in accordance with Section 309, VDOT Road and Bridge Specifications.

3.02 WOODCARPET

A. Install drainage piping as per plans. Drain towards storm line and connect to solid pipe.

B. Geotextile fabric shall be continuous. Lap all material splices a minimum of 4" width. Seams should be placed in same direction as routes of play equipment.

C. Wood edging shall be installed according to plan. Joints shall be alternated, beams shall be 1/2" above grade.

D. WOODCARPET (resilient surface material) shall be spread to a 12 inch depth after compaction.
To achieve compaction:

1. Apply 6"-10" of WOODCARPET to the top layer of geotextile fabric. If WOODCARPET is not moist to the touch, wet down surface with approximately 1" of water.

2. Using a vibrating roller or flat surface compactor, run over the surface two times, changing direction 90° on each pass. WOODCARPET should compact to approximately 4.5 inches.

3. Apply second 6"-10" of WOODCARPET, adding moisture as indicated above.

4. Compact second layer of WOODCARPET using a vibrating roller or flat surface compactor, as instructed above. Total depth of WOODCARPET should be approximately 9".

5. Apply final 4" to 8" layer of WOODCARPET. If WOODCARPET is not moist to the touch, wet down the surface with approximately 3/4" of water.

6. Using a rake, or other leveling device, remove all hills and valleys from the surface.

7. On final compaction, level the surface between each change of direction. Run compactor over the surface at least 3 times to achieve final compaction. Final WOODCARPET depth should now be approximately 12".

3.03 COORDINATION

Coordinate installation of play surface and drainage with play equipment provided by others.

END OF SECTION

SECTION 32 30 00 - SITE IMPROVEMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide design build installation of site amenities to include labor, engineering, equipment and materials to install pre-fab fire pit.

1.02 RELATED WORK

A. Section 32 13 14 POOL DECK

1.03 SUBMITTALS

A. Provide submittals in accordance with Section 01 30 00 ADMINISTRATIVE REQUIREMENTS.

B. Provide shop drawings or product data for each of the items specified. Indicate configuration, dimensions, rough-in information, and installation details.

C. Provide duplicate samples of finishes, color chips and materials indicated for approval by the Landscape Architect.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store the materials of this Section in accordance with Section 01 60 00.

1.05 ACCEPTABLE MANUFACTURERS

A. Manufacturer as listed shall provide site furnishings complying with drawings as shown.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide manufacturers specified.

B. Provide fire pit as per plans. Install as per manufacturer’s instructions.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide anchors, anchor bolts, sleeves, rough-in location and sizes, and setting templates or dimensions to the appropriate trade for installation.

B. Install site improvements as per direction of manufacturer’s installation details and as per local codes and International Building Code.

C. Verify with Landscape Architect exact location of items to be installed.

3.02 INSTALLATION

A. Verify correct location of anchors and rough-ins prior to beginning work. Beginning of installation indicates acceptance of conditions.

B. Install and assemble items in accordance to manufacturer's installation instructions and the approved shop drawings.

C. Provide anchor bolts, anchor assembly, concrete footings, anti- theft bolts, and concrete anchor footings as recommended by product manufacturer to permanently anchor all site furniture to prevent theft.

3.03 CLEANING

A. Upon completion of installation remove masking or protection material from metals. Remove any concrete smears or dirt from finished surfaces. Miscellaneous packing materials and debris shall be removed.

END OF SECTION

SECTION 32 84 00 - IRRIGATION SYSTEM

PART 1 GENERAL

1.01 DESCRIPTION

A. The specified work includes the furnishing of all design services, drawings, approvals, materials, equipment, well and or city water connection and backflow preventer, well (s), underground power connection, meter and labor necessary for the providing an irrigation system for the lawn and shrub areas as shown on the drawings and as herein specified.

B. Contractor shall connect irrigation system to City water source or well as directed by owner. When City water source is used, tap into water line, provide meter, and backflow preventer and hotbox. Backflow preventer to comply with Hampton codes and standards and shall include a 'Hot Box' temperature enclosure around backflow preventer.

C. One year parts and service contract on irrigation system. Owner has option to renew service contract for additional years. Fee for service shall comply with set fee service contract.

1.02 RELATED WORK

Section 32 13 13	Concrete Pool Deck
Section 32 91 00	Plant Materials and Planting
Section 32 91 13	Soil Preparation - Topsoil
Section 32 93 23	Sodding

1.03 QUALITY ASSURANCE

A. Meet or exceed standards and installation standards as set forth by the manufacturer and the prevailing trade industry.

1.04 SUBMITTALS

A. Submit the following test reports to Landscape Architect:

1. Design build irrigation plan

2. Catalog pages indicating all irrigation fittings and equipment to be used.

1.05 PROJECT CONDITIONS

A. The Contractor shall be notified in writing by the owner or his authorized representative when to commence work of planting and irrigation installation. Thereafter, planting operations and irrigation installation shall be conducted under favorable weather conditions which are normal for such work as determined by accepted practice in the locality of the project.

B. The Contractor shall be familiar with the alignment of existing or new utility lines, ducts and buried cables. The Contractor shall field check the location of utilities

before any installation of material or plants. The Contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement. If discrepancies occur, consult landscape architect.

C. Protect existing utilities, paving, and other facilities from damage caused by irrigation installation.

D. All work shall be accomplished under the direction of a competent, experienced foreman.

PART 2 PRODUCTS

2.01 MATERIALS

A. All major components (Valves, Heads, and Controllers) shall be manufactured by a single manufacturer - 'Rainbird', 'Toro', or 'Hunter'. Ground cover and shrub bed heads shall be 12" high min. pop-up heads.

B. Backflow preventor shall be by "Watts".

C. Temperature control hot box around backflow preventor shall be lockable fiberglass enclosure by "Hot Box". HB-1 to HB-2 models with lock by Hot Box, (800) 736-0236.

D. Pressure lines on irrigation systems shall be class 200 pvc pipe by "Lasco".

E. Lateral lines on irrigation system shall be approved PVC or PE pipe as selected by installer.

F. Irrigation controller shall be provided by contractor and shall be as manufactured by 'Toro', 'Rainbird' or 'Hunter' .

G. Irrigation controller wire shall be individual stands of insulated wire. Multi strand bundled wire packages are not acceptable.

PART 3 EXECUTION

3.01 EXECUTION

A. The irrigation contractor shall provide an irrigation package to include design and installation of the system to water the limits of the property and planting as shown on the planting plan.

1. All lateral pipe to Class 200 PVC or approved poly pipe. All pressure main lines to be Class 200 PVC Pipe or thicker.

2. Irrigation controller shown schematically and located at meter pedestal. Landscape Architect to field verify location.

3. Irrigation Contractor shall adjust sprinkler head locations and spray patterns to work with landscaping and eliminate water hitting building walls and pavements.

4. Irrigation contractor to make field adjustments for the actual site and adjust nozzle radius to provide 100% coverage.

5. In the event repairs are required in planting beds installed at the time of required repairs, the Irrigation Contractor shall top dress disturbed mulch beds with approved mulch. Any plant damage shall be paid for by Irrigation Contractor.

6. All electric solenoid valves to be provided with a 10 inch PVC valve box. There shall be no more than one (1) valve per valve box.

7. All main line piping to be located a minimum of 12 inches below finished grade to the top of pipe. All wiring to be placed below mainline. All lateral lines are to have 12 inches of cover. All mainline piping and wiring, when not run in same trench as mainline, will have a metallic marking tape placed in trench at a depth of 6 inches below finish grade.

8. Provide a method for winterizing the irrigation system. Method to be approved by Landscape Architect.

9. Piping, zoning and head layout designed and installed by Irrigation Contractor. Prior to construction, contractor shall submit shop drawings to Landscape Architect for approval. Pipes shall be laid out in a branch type pattern and shall not be laid out in an 'end fed' pattern.

10. Pressure line shall be laid out to reduce pressure loss and provide equal gallonage to all irrigation zones.

11. Head and/or drip irrigation spacing not to exceed maximum recommended spacing set by manufacturer. Triangular head spacing is preferred, provide minimum heads to provide 100 percent coverage.

12. Controller shall provide one station per irrigation zone and electric valve. Controller to be in waterproof enclosure and lockable. Electricalmechanical series controller by ‘Rainbird’, ‘Toro’ or ‘Hunter’.

13. Electric solenoid valves to be 252 series by ‘Rainbird’, ‘Toro’ or ‘Hunter’

14. Limit of irrigation to be limits of irrigation as shown on the plans.

15. At the option of the contractor, pipes under paving can be bored or sleeved prior to paving and road construction if applicable. Sleeved pipes must be coordinated with the general contractor and will be the responsibility of the Irrigation Contractor. Provide sleeve when line is bored under paving.

16. All taps, permits and fees paid by Irrigation Contractor. Contractor to comply with all state and local codes.

17. All trenching for irrigation lines shall be placed at the dripline of existing trees with a minimum of 8'-0" away from all trunks.

18. All filling of trenches to be completed in a professional manner. All trench settlement to be repaired by the contractor.

19. Provide one year guarantee on parts and labor of irrigation system. This is to include all winterization and spring startups at no cost to the owner while under warranty.

20. Irrigation contractor shall submit irrigation plan to landscape architect for approval. Site plan shall show gallonage per zone, zones, head type, nozzle size, and location, pipe layout, pipe size, valve size, well or pump station location, electric solenoid valve and valve box location. No work shall proceed until landscape architect has approved the irrigation plan. Designate corresponding zone numbers on the controller and provide reduced copy of map inside controller door.

21. All electric solenoid valves to be enclosed in a P.V.C. value box with two (2) C.F. of pea gravel at bottom for drainage.

22. Proposed heads or drip irrigation to be installed in relationship to proposed and finished grades.

23. Contractor shall provide power connections to Irrigation Controller and backflow preventer.

24. All below grade wire splices to be enclosed in a P.V.C. splice kit by '3M' or equal. Splices are to occur in valve boxes only.

25. Contractor to winterize system for the first year with a one year guarantee on parts and labor of irrigation system at no cost to the owner while under warranty.

26. All nozzles to operate at manufacturers recommended pressure rate. Maximum variation of operating pressure in each zone to be 10% unless approved by Landscape Architect. Pipe size and pipe layout to account for this.

27. All P.V.C. pipe to be solvent-glue connected.

28. Locate new valves and piping as not to conflict with proposed trees and large shrubs as shown on the planting plan.

29. Use 14 gauge individual ‘single’ strand wire or larger for each electric solenoid valves. Use of multi-strand irrigation control wire is prohibited.

30. Provide 3,500 psi concrete footing under ‘Hot Box’ backflow preventer enclosure.

3.02 INSPECTION FOR ACCEPTANCE

A. Inspection of the irrigation system to determine completion of contract work, exclusive of the possible minor adjustments, will be made by the owner or his authorized representative upon written notice requesting such inspection submitted by the Contractor at least ten (10) days prior to the anticipated date.

B. Acceptance. After inspection, the Contractor will be notified in writing by the owner or his authorized representative of acceptance of all work, exclusive of the possible replacement of plants subject to guarantee or, if there are any deficiencies, of the requirements for completion of the work. Work remaining to be done shall be subject to reinspection before acceptance. The owner will, after acceptance, accept the responsibility for maintenance as prescribed in the contractor's schedule, as outlined above. Final payment to be held until an "As Built" drawing is delivered and accepted by the owner.

3.3 CLEAN UP

A. Clean Up of Site. At the end of each day's work, the Contractor shall remove all trash and other debris resulting from his planting operations. Also, the Contractor shall police the entire site and remove all forms of existing rubbish, including wire, cans, and piles of dead grass, all of which shall be removed from the site.

END OF SECTION

SECTION 32 91 00 - PLANT MATERIALS AND PLANTING

PART 1 GENERAL

1.01 DESCRIPTION

The specified work includes the furnishing of all materials, equipment, and labor necessary for the planting of trees and shrubs; protection and maintenance; and all related items required to complete the work shown on the drawings and as herein specified.

1.02 RELATED WORK

A. Section 32 84 00 Irrigation System (design build by owner)

B. Section 32 91 13 Soil Preparation – Topsoil

C. Section 32 93 23 Sodding

1.03 QUALITY ASSURANCE

A. Nomenclature. The names of the plants required under this contract conforms with Standardized Plant Names as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not included therein conform generally with names accepted in the nursery trade.

B. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock" by the American Association of Nurserymen.

1.04 SUBMITTALS

A. Submit the following test reports to the Owner:

1. Soil Analysis of topsoil for planting mix including:

a. pH factor.
b. Mechanical analysis (composition).
c. Percentage of organic content.
d. Recommendations on type and quantity of additives required to establish satisfactory pH and bring supply of nutrients to satisfactory level for planting.

1.05 PROJECT CONDITION

A. The Contractor shall be notified in writing by the owner or his authorized representative when to commence work of planting. Thereafter, planting operations shall be conducted under favorable weather conditions which are normal for such work as determined by accepted practice in the locality of the project. At the option of, and on the full responsibility of the Contractor.

B. The Contractor shall be familiar with the alignment of existing or new utility lines, ducts and buried cables. The Contractor shall field check the location of utilities before any installation of material or plants. The Contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement. If discrepancies occur, consult the Owner. Changes shall be made in the location of

plant materials only upon written notification by the Owner.

C. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

D. A complete list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings under 'PLANT LIST'. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

E. All work shall be accomplished under the direction of a competent, experienced foreman.

1.6 PLANT GUARANTEE AND REPLACEMENT

A. Guarantee. The Landscape Contractor shall guarantee the trees, shrubs, and ground cover for one year from date of acceptance by the owner or his authorized representative, and they shall be alive and in satisfactory growth at the end of the guarantee period.

B. Replacement. At the conclusion of the guarantee period, inspection will be made by the Owner or his authorized representative, written notice requesting such inspection submitted by the Contractor at least ten days before the termination date as stated under 1.04 A. Any plant required under this contract that is dead, in an unhealthy, unsightly, or badly impaired condition, as determined by the owner or his authorized representative, shall be removed from the site; these plants shall be replaced as soon as it is reasonably possible, at no extra cost to the owner. No replacement shall be made in any season definitely unfavorable for planting. Provide one year guarantee on replacement plants.

C. Materials and Operations. All replacements shall be plants of the same kind and size as specified in the Plant List. They shall be furnished and planted as specified under New Planting.

D. At the conclusion of the guarantee period, the Contractor shall remove all stakes, wire, rubber hose, and wrapping from trees and remove them from the site, and shall remove the earth saucer from around each plant, level with adjacent finish grade, and seed this area.

2.01 MATERIALS

A. Plants

1. Quality and Size. Plants shall be nursery grown, have a habit of growth that is normal for the species, and shall be sound, healthy, vigorous, and free from insect pests, plant diseases, and injuries. All plants shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning, with branches in normal position. Any necessary pruning shall be done at time of planting and will be consistent with the natural growth habit of each species. Requirements for the measurements, branching, grading, quality, balling and burlapping of plants in the Plant List shall exceed the Code of Standards currently recommended by the American Association of Nurserymen, Inc., in the American Standard for Nursery Stock.

   In addition to the minimum standards as listed above, the Landscape Architect is looking for plants which possess specimen quality and include

the following criteria:

Full, symmetrical growth and full symmetrical tree crowns.
No bark scarring or damage.
No sucker growth or prior plant damage.
Straight 'non-crooked' tree trunks for single stem trees and 'non-intertwined' or 'twisted' trunks for multi-stem trees.
Matched growth for multiple plants.
Plants which possess healthy growth.

At the discretion of the Owner, plants may be rejected based on any of the above listed criteria.

2. Substitutions will not be accepted unless specifically approved in writing by the owner or his authorized representative. Proposed substitutes shall be of the nearest equivalent size or variety as the plant actually specified, having the same essential characteristics. Proposed substitutes of lesser cost shall have an equitable adjustment of contract price. Plants of greater value may be provided without additional cost to the owner.

3. Balled and Burlapped Plants. Plants designated "B&B" in the Plant List shall be balled and burlapped. They shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine or cord. Where necessary to prevent breaking or cracking of the ball.

4. Protection after Delivery. The balls of "B&B" plants which cannot be planted immediately on delivery shall be covered with moist soil or mulch, or other protection from drying winds and sun. All plants shall be watered as necessary.

5. Container plants shall be healthy, vigorous, well branched, well rooted and well established in the container in which they are provided.

2.02 ACCESSORIES

A. Topsoil shall be furnished by the Landscape Contractor at his expense. Topsoil shall be 'Lite Top' topsoil by American Hydrotech and to be installed as per manufacturers recommendations.

B. Commercial Fertilizer shall be 18-16-12 'Eight to Nine month slow release formula' as manufactured by 'Sierra Chemical, Lebanon Chemical Company and shall conform to the applicable state fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis and trademark. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted. Do not mix fertilizer in prepared soil mixture for azaleas. Use 'cottonseed meal' for fertilizing azaleas.

C. Perlite shall be delivered to site in unopened original containers and free of any foreign materials.

D. Materials for Staking and Wrapping.

1. Stakes for supporting trees shall be straight, sound, rough-sawn two-by-twos. Stain stakes dark black with oil base stain. 2 inch x 2 inch oak or other approved wood typical.

2. Wire for fastening trees to stakes shall be No. 12 gauge pliable solid strand galvanized steel. Secure with double strands of wire.

2. Hose to encase wires used for fastening trees to stakes shall be new two-ply reinforced rubber garden hose. All hose used shall be black.

3. Wrapping material for tree trunks shall be two thicknesses of heavy crinkle paper cemented together with bituminous material. Wrapping material shall be in strips 6 to 10 inches wide. Twine for typing shall be lightly tarred medium to course sisal yarn.

E. Liquid seaweed shall be applied to plants as per manufacturer's recommended rate. Apply manufacturer's recommended quantity of mixed solution at twice the manufacturer's recommended rate. Liquid seaweed shall be 'Thorvin TM' as supplied by 'Necessary Trading Company'. Liquid seaweed shall be 100% natural product free of salt and commercially mined and sold by an approved manufacturer.

PART 3 EXECUTION

3.1 EXECUTION

A. Layout. The Contractor is responsible for verifying all site conditions in the field. New planting shall be located where shown on the plans except where obstructions below ground or overhead are encountered or where changes have been made in the construction.

B. Obstructions Below Ground or Overhead. It is not contemplated that planting shall be done where the depth of soil over underground construction, obstructions or debris is insufficient to accommodate the roots or where pockets of debris or impervious soil will require drainage. Where such conditions are encountered in excavation of planting areas, and where the debris, concrete, or other obstruction cannot be broken and removed by hand methods in the course of digging plant pits of the usual size, and where trees to be planted are found to be under overhead wires.

C. Drainage of Pits and Beds. Where planting pits are dug in wet areas, or where adverse subsoil drainage problems are encountered, set plants 6 inches higher than normal, using an extra depth of crushed stone and sand, up to 12 inches total depth to keep root ball from settling. The immediate area outside the saucer shall be blended with suitable soil to meet existing grade within five feet (5'-0") of edge of pit. Drainage may also be provided by drilling holes through non-porous subsoil at the bottom of planting excavations to a depth to assure percolation, or by any other method approved by the Landscape Architect.

D. Herbicide. Where shrub or ground cover beds are to be established, the area shall be treated with "Surflan" pre-emergent by Elanco as per manufacturer's recommendations. Where cover of grass or weeds exist, bed areas shall be treated with "Round-Up" by Monsanto as per manufacturer's recommendations. Appearance of weeds within the first month of planting guarantee shall be treated with "Round-up".

E. Amended Soil Mixture. Prepared soil mixture, for use where specified for backfilling plant pits and beds, shall be mixed on the project site. Topsoil, composted cow manure and or organic compost and sand shall be thoroughly mixed in the following proportions by volume: 6 parts of topsoil, 2 parts composted cow manure or composted leaf matter and 1 part coarse sand. Mixing shall be done in a thorough manner to ensure uniform distribution of materials throughout the mixture. Osmocote fertilizer shall be applied to all ground covers, perennials and shrubs as per manufacturer's recommended rate. Apply adjacent to entire root ball including base of ball at junction of prepared soil mixture. Fertilizer tree spikes are not acceptable. Ground cover and perennial beds shall have 9 inches minimum depth amended soil mixture. Shrub beds shall have minimum depths of amended soil mixture as indicated on plans.

F. Excess Excavated Soil shall be disposed of where and as directed by authorized representative.

3.02 INSTALLATION

A. Planting Pits. Reasonable care shall be exercised to have pits dug and soil prepared prior to moving plants to their respective locations. The minimum allowable dimensions of plant pits shall be: 6 inches deeper than the depth of ball or the depth of base roots; for ball or root spreads up to 2 feet, pit diameters shall be twice the root spread, with a minimum diameter of 18 inches; for ball or root spreads from 2 to 4 feet, pit diameters shall be 2 feet greater; for ball or root spreads over 4 feet, pit diameters shall be 1 1/2 times the ball or root spread. Beds for ground cover shall be 3 inches deeper than that original container, or a minimum of 9 inches or prepared soil mixture.

B. Setting Plants. Unless otherwise specified, all plants shall be planted in pits, centered, and set on well compacted prepared soil mixture - a minimum depth of 6 inches for trees and large shrubs and minimum depth of 4 inches for shrubs. The finished grade level of the plant, after settlement, will be the same as that at which the plant was grown. They shall be planted upright and faced to give the best appearance or relationship to adjacent structures. No burlap shall be pulled out from under balls. Platform and surplus binding from top and sides of the balls shall be removed. Container grown plants shall have the root ball scarified (butterflied) starting the cut at the center of the base and cutting upward 1/2 the depth of the ball. Prepared topsoil shall be placed and compacted carefully to avoid injury to roots and to fill all voids. When the hole is nearly filled, add water as necessary and allow it to soak away. Fill the hole to finished grade, and form a shallow saucer around each plant by placing a ridge of topsoil around the edge of each pit. After the ground settles, additional soil shall be filled into the level of the finished grade.

C. Staking and Wrapping.

1. Staking. Stakes shall be equally spaced about each tree and shall be driven vertically into the ground to a depth of three feet in such a manner as not to injure ball or roots. Trees shall be fastened to each stake at a height of about five feet by means of two strands of wire. Stakes shall be uniform in height and placed as designated on the accompanying drawing, and painted as specified.

2. Wrapping. Promptly after planting, the trunks of all trees designated to be wrapped shall be wrapped spirally from the ground line to the height of the second branches. All wrapping shall be neat and snug and the material shall be held in place by a suitable cord. There shall be an overlap of wrapping material, a minimum of 50 percent.

D. Mulching. All plants shall be mulched with a 3 inch layer of shredded hardwood bark within two (2) days after planting. This mulch shall entirely cover the planting bed.

3.03 MAINTENANCE

A. Maintenance shall begin immediately following the last operation of installation for each plant and shall continue in accordance with the following requirements.

1. New Planting shall be protected and maintained by the Contractor until installation of planting is complete and has been accepted. Maintenance shall include watering, weeding, cultivating, mulching, tightening and repairing of wires, removal of dead material, resetting of plants to proper grades or upright position and restoration of the planting saucer, and other necessary operations. If planting is done after lawn preparation, proper protection to lawn areas shall be provided, and any damage resulting from planting operations repaired promptly at no extra cost to the owner.

3.04 INSPECTION FOR ACCEPTANCE

A. Inspection of the planting to determine completion of contract work, exclusive of the possible replacement of plants, will be made by the owner or his authorized representative upon written notice requesting such inspection submitted by the Contractor at least ten (10) days prior to the anticipated date.

B. Acceptance. After inspection, the Contractor will be notified in writing by the owner or his authorized representative of acceptance of all work, exclusive of the possible replacement of plants subject to guarantee or, if there are any deficiencies, of the requirements for completion of the work. Work remaining to be done shall be subject to reinspection before acceptance. The owner will, after acceptance, accept the responsibility for maintenance.

3.05 CLEAN UP

A. Clean Up of Site. At the end of each day's work, the Landscape Contractor shall remove all trash and other debris resulting from his planting operations. Also, the Landscape Contractor shall police the entire site and remove all forms of existing rubbish, including wire, cans, and piles of dead grass, all of which shall be removed from the site.

END OF SECTION

SECTION 32 91 13 - SOIL PREPARATION- TOPSOIL

PART 1 GENERAL

1.01 DESCRIPTION

The specified work includes the furnishing of all materials, equipment, and labor necessary for the installation of topsoil; and all related items required to complete the work shown on the drawings and as herein specified.

1.02 RELATED WORK

Section 32 84 00 Irrigation System (design build by owner)

Section 32 91 00 Plant Material and Planting

1.03 QUALITY ASSURANCE

Topsoil shall be a natural, fertile, friable soil constituting the "A" horizon from naturally well drained areas. It shall not be excessively acidic or alkaline nor contain toxic substances that may be harmful to plant growth. Topsoil shall be without admixture of subsoil and shall be reasonably free from clay clods, stones, roots or similar substances one inch or more in diameter, debris, or other objects that may be a hindrance to planting operations. Topsoil shall meet all physical and chemical criteria and requirements. Contractor shall test topsoil and amend topsoil for pH, drainage capabilities and for organic qualities suited to provide organic topsoil. Soil testing shall be accomplished by a soil testing lab sponsored and run by the State (Commonwealth) of Virginia or other suitable lab on approval.

1.04 SUBMITTALS

A. Submit the following test reports to the Owner:

1. Soil Analysis of topsoil brought from outside sources. Topsoil should be tested by an independent laboratory to determine it's suitability for landscape use. The following suggested testing methodology and criteria are recommended.

    a. pH factor.
    b. Mechanical analysis (composition).
    c. Percentage of organic content.
    d. Recommendations on type and quantity of additives required to establish satisfactory pH and bring supply of nutrients to satisfactory level for planting.

1.05 PROJECT CONDITION

A. The Contractor shall be notified in writing by the owner or his authorized representative when to commence work. Thereafter, operations shall be conducted under favorable weather conditions which are normal for such work as determined by accepted practice in the locality of the project. At the option of, and on the full responsibility of the Contractor, operations may be conducted under unseasonable conditions without additional compensation.

B. The Contractor shall be familiar with the alignment of existing or new utility lines, ducts and buried cables. The Contractor shall field check the location of utilities

before any installation of material. The Contractor shall be responsible for all damage resulting from neglect or failure to comply with this requirement. If discrepancies occur, consult the Owner. Changes shall be made in only upon written notification by the Owner.

C. Protect existing utilities, paving, and other facilities from damage caused by operations.

D. All work shall be accomplished under the direction of a competent, experienced foreman.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil

1. Soil texture will be USDA **sandy loam** approximating the following particle size distribution and requirements:

Approximate Particle Distribution	
Gravel	Trace
Coarse to medium sand	40-65%
Fine to very fine sand	10-20%
Silt	10-15%
Clay	10-20%

Soluble salt level: Less than 844 ppm (.67 mmho/cm)

Percent organic matter: 4 to 8%, by weight.

Soil pH: 5.5 - 6.5

2. Topsoil to be from Isle of Wight Materials, P.O. Box 216, Carrollton, Virginia 23314, or approved equal.

3. Substitutions will not be accepted unless specifically approved in writing by the owner or his authorized representative. Proposed substitutes shall be of the nearest equivalent as specified, having the same essential characteristics. Proposed substitutes of lesser cost shall have an equitable adjustment of contract price.

3. Soil amendments as per Section 02490 at planting beds.

PART 3 EXECUTION

3.01 EXECUTION

A. Topsoil shall be furnished by the Contractor at his expense. The Contractor shall furnish sufficient topsoil to properly install all work as specified herein, and as shown on the drawings.

B. Layout. The Contractor is responsible for verifying all site conditions in the field. If discrepancies occur consult the Owner. Necessary adjustments shall be made only

after approval by the Owner.

C. Obstructions Below Ground. Underground construction, obstructions or debris when insufficient to accommodate proper topsoil coverage, where such conditions are encountered in excavation, and where the debris, concrete, or other obstruction cannot be broken and removed by hand methods in the course of digging. No changes shall be made without the prior approval of the Owner.

D. Drainage. Drainage may also be provided by drilling holes through non-porous subsoil at the bottom excavations to a depth to assure percolation, or by any other method approved by the Landscape Architect. If these conditions occur, consult Owner prior to proceeding.

E. Excess Excavated Soil shall be disposed of where and as directed by the Owner or his authorized representative.

3.02 INSTALLATION

A. Topsoil. Contractor is responsible for all topsoil to be installed to a depth of four inches minimum in lawn areas and 16" depth at shrub beds and tree areas as requested on related plans and be maintained throughout entire site as indicated. Topsoil shall be placed at the edges of pavement as to allow for the installation of sod so that the top of mowed grass is of equal height of pavement. If discrepancies occur consult the Owner. Necessary adjustments shall be made only after approval by the Owner.

3.03 MAINTENANCE

A. Maintenance shall begin immediately following the last operation of installation and shall continue in accordance with the following requirements.

1. Topsoil shall be protected and maintained by the Contractor until installation of planting is complete and has been accepted. Maintenance shall include erosion prevention, settling and other necessary operations to maintain proposed grades.

3.04 INSPECTION FOR ACCEPTANCE

A. Inspection of the topsoil to determine completion of contract work, exclusive of the possible replacement, will be made by the owner or his authorized representative upon written notice requesting such inspection submitted by the Contractor at least ten (10) days prior to the anticipated date.

B. Acceptance. After inspection, the Contractor will be notified in writing by the owner or his authorized representative of acceptance of all work, to guarantee or, if there are any deficiencies, of the requirements for completion of the work. Work remaining to be done shall be subject to reinspection before acceptance. The owner will, after acceptance, accept the responsibility for maintenance.

3.05 CLEAN UP

A. Clean Up of Site. At the end of each day's work, the Contractor shall remove all trash and other debris resulting from his operations. Also, the Contractor shall police the entire site and remove all forms of existing rubbish, including wire, cans, and piles of dead grass, all of which shall be removed from the site.

END OF SECTION

SECTION 32 93 23 – SODDING

PART 1 GENERAL

1.01 DESCRIPTION

A. Provide sodded lawns as shown and specified. The work includes:

1. Topsoil installation.
2. Soil preparation.
3. Sodding lawns.
4. Maintenance.

1.02 RELATED WORK

A. Section 32 84 00 IRRIGATION SYSTEM (design build by owner)

B. Section 32 91 00 PLANT MATERIALS AND PLANTING

C. Section 32 91 13 SOIL PREPARATION - TOPSOIL

1.03 QUALITY ASSURANCE

A. Sod: Comply with American Sod Producers Association (ASPA) classes of sod materials.

1.04 SUBMITTALS

A. Submit the following test reports to the Landscape Architect and Owner.

1. Soil analysis including:

a. Chemical analysis to include:
pH factor
Soluble salts
Herbicide residue
b. Mechanical analysis (composition)
c. Percentage of organic content
d. Recommendations on type and quantity of additives required to establish satisfactory pH and bring supply of nutrients to satisfactory level for planting.

2. All soil testing shall be done at the expense of the Contractor.

3. If topsoil test results fail to meet the specifications, it shall be adjusted and etested, or another source secured, tested and submitted for approval.

4. Current year copy of Virginia Crop Improvement Association (VCIA) recommendations for seed and sod types for Richmond Area.

B. Certificate of crop purity from sod producer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Cut, deliver, and install sod within a 24-hour period.

1. Do not harvest or transport sod when moisture content may adversely affect sod survival.

2. Protect sod from sun, wind, and dehydration prior to installation.

3. Do not tear, stretch, or drop sod during handling and installation.

1.06 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least forty-eight (48) hours prior to start of sodding operations.

B. Protect existing utilities, paving, and other facilities from damage caused by sodding operations.

C. Perform sodding work only after planting and other work affecting ground surface has been completed.

D. Restrict traffic from lawn areas until grass is established. Erect signs and barriers as required.

E. Provide hose and lawn watering equipment as required.

1.07 WARRANTY

A. Provide a uniform stand of grass vigorously growing by watering, mowing, and maintaining lawn areas until final acceptance. Resod areas with specified materials, which fail to provide a uniform stand of grass until all affected areas are accepted by the Landscape Architect. Contractor shall guarantee and maintain the lawn until a final acceptance inspection has been completed and a Certificate of Acceptance is issued.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: Nursery grown; types as called for on drawings or specifications. Provide well-rooted, healthy sod, free of weeds, diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density and free of weeds, undesirable grasses, stones, roots, thatch, and extraneous material; viable and capable of growth and development when planted.

1. Grass sod shall be well established mown lawn grass turf. The sod shall be a grass of Fescue blend, Jaguar III, Guardian, Shortstop, Monarch, Pixie and other category1 (VCIA) Virginia Crop Improvement Association fescue blended for Tidewater area). It shall be vigorous, well-rooted, healthy turf, free from disease, insect pests, weeds, other grasses, stones, and any other harmful or deleterious matter.

2. Sod shall be machine stripped at a uniform soil thickness of approximately 1 inch (+ or - 1/4 inch). The minimum acceptable solid thickness shall be 3/4 inches. The measurement for thickness shall exclude top growth and thatch and shall be determined at the time of cutting in the field.

3. Sod shall be rolled or folded prior to lifting. Handling of sod shall be done in a manner that will prevent tearing, breaking, drying, or any other damage.

B. Fertilizer:

1. Fertilizer shall be 13-25-12 at a rate according to manufacturer's and sod producers recommendation.

C. Water: Free of substance harmful to sod growth. Hoses or other methods of transportation furnished by Contractor.

D. Topsoil shall be furnished by the Landscape Contractor at his expense. Existing stockpiled (if available) topsoil can be used in planting areas by the contractor upon approval of landscape architect. Contractor shall test stockpiled topsoil and amend topsoil for pH, drainage capabilities and for organic qualities suited to provide organic topsoil. Soil testing shall be accomplished by a soil testing lab sponsored and run by the State (Commonwealth) of Virginia or other suitable lab on approval. The Contractor shall furnish sufficient topsoil to properly install all work as specified herein, and as shown on the drawings. If topsoil, meeting the stated requirements herein, is present on the site after herbicide application and tilling processes, then no additional topsoil will be required to be brought onto site. Topsoil furnished shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas. It shall have a pH of between 6.0 and 6.8 and be free of toxic substances which may be harmful to plant growth. Topsoil shall be without admixture of subsoil and shall be cleaned and reasonably free from clay lumps, stones, stumps, roots, and similar substances two inches or more in diameter, debris, or other objects which might be a hindrance to planting operations. Soil to be from the Greenbrier region of Chesapeake, or Isle of Wight Materials, P.O. Box 216, Carrollton, Virginia 23314, or equal.

E. Lime: All fine graded soiled areas to be sodded are to be limed with "Hi-Calcium Lime" at a rate of 12-15 lb. to 100 square feet, achieving a soil pH of 6.5 - 6.9. "Hi-Calcium lime" is available from: Necessary Trading Company, New Castle, Virginia 24127 (703) 864-5103. Lime to be "scratch raked" into surface of soil.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine finish surfaces, grades, topsoil quality, and depth.
Do not start sodding work until unsatisfactory conditions are corrected.

B. Sod shall be installed in place on the site not more than twenty-four (24) hours after cutting.

C. Soil Sterilants: No sod shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic effects. The contractor shall assume full responsibility for any loss or damage to sod arising from improper use of such sterilants or due to his failure to allow sufficient time to permit dissipation of toxic effects, whether or not such sterilants are specified herein.

3.02 PREPARATION

A. Limit preparation to areas which will be immediately planted.

B. Loosen topsoil of lawn areas to be planted. Remove stones over 1" in any dimension and sticks, roots, rubbish, and extraneous matter.

C. Grade lawn areas to smooth, free draining and even surface with a loose, uniformly fine texture. Roll and rake; remove ridges and fill depressions as required to drain.

D. Apply fertilizer at the rate of 50 lbs. per 1,000 sq. ft. nitrogen per 1,000 sq. ft. or as per manufacturer's recommendation.

E. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to sodding.

F. Three (3) applications of systemic herbicide ('Round-Up') shall be applied at 7-10 day intervals to all existing bermuda grass/weeds on site *prior* to fine grading and sodding. Herbicide shall be applied only when air temperature is above 60 degrees (Fahrenheit) and no less than 4 hours before a rain event or sundown.

3.03 INSTALLATION

A. Sodding:

1. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, drains, and seeded areas.

2. Sod shall be laid parallel to the direction of the slope and in a manner which will permit joints to alternate. Sod to be rolled in with a "water weight" roller after laying.

3. Sod pieces shall be fitted together tightly in that no joint is visible, and sod tamped firmly and evenly by hand. Sod shall be staked on all slopes greater than 3:1.

4. Do not install sod on saturated or frozen soil.

5. Water sod lightly with a fine spray immediately after laying.

6. Roll with a water filled, commercial lawn roller to ensure contact with subgrade.

7. Immediately following rolling, the sod shall be watered thoroughly.

3.04 MAINTENANCE

A. Maintain sodded lawns until final acceptance of the project.

B. Maintain sodded lawn areas, including watering, spot weeding, mowing, application of herbicides, fungicides, insecticides and resodding until a full, uniform stand of grass free of weed, undesirable species, disease, and insects is achieved and accepted by the Landscape Architect.

1. FESCUE SOD: Mowing shall be accomplished in areas planted by Contractor when grass reaches a height of 3 ½ inches. Height of cutting shall be 2 to 2 ½ inches.

2. Repair, rework, and resod all areas that have washed out or are eroded. Replace undesirable or dead areas with new sod.
3. The contractor must perform all remedial work within five (5) days of

notification from the Owner's representative.

3.05 ACCEPTANCE

A. Work will be inspected at completion of installation and accepted subject to compliance with specified materials and installation requirements.

B. Inspection to determine acceptance of sodded lawns will be made by the Landscape Architect, upon Contractor's request. Provide notification at lease two (2) working days before requested inspection date.

1. Sodded areas will be acceptable provided all requirements including maintenance, have been complied with, and a healthy, even colored viable lawn is established, free of weeds, undesirable grass species, disease and insects.

C. Upon acceptance, the Owner will assume lawn maintenance.

3.06 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from sodding operations.

END OF SECTION

SECTION 33 01 10.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 14 16.

B. Disinfection of building domestic water piping specified in Section 22 10 05.

C. Disinfection of water well.

D. Disinfection of water storage tanks.

E. Testing and reporting results.

1.02 RELATED REQUIREMENTS

A. Section 33 14 16 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; 2011.

B. AWWA B301 - Liquid Chlorine; 2010.

C. AWWA B302 - Ammonium Sulfate; 2010.

D. AWWA B303 - Sodium Chlorite; 2010.

E. AWWA C651 - Disinfecting Water Mains; 2014.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: From authority having jurisdiction indicating approval of water system.

D. Disinfection report:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
   5. Date and time of flushing start and completion.
   6. Disinfectant residual after flushing in ppm for each outlet tested.

E. Bacteriological report:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.
   4. Test locations.
   5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
   6. Coliform bacteria test results for each outlet tested.
   7. Certification that water conforms, or fails to conform, to bacterial standards of County of Gloucester, Virginia.

1.05 QUALITY ASSURANCE

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of Virginia.

C. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping system has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Inject treatment disinfectant into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

G. Pressure test system to 20 psi or to pressure requested by County of Gloucester, Virginia. Repair leaks and re-test.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00.

B. Test samples in accordance with County of Gloucester requirements.

END OF SECTION

SECTION 33 05 13 - MANHOLES AND STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Monolithic concrete manholes with transition to lid frame, covers, anchorage, and accessories.

B. Modular precast concrete manhole sections with tongue-and-groove joints covers, anchorage, and accessories.

C. Monolithic FRP manholes with transition to lid frame, covers, anchorage, and accessories.

D. Masonry manhole sections with masonry transition to lid frame, covers, anchorage, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 04 05 11 - Mortar and Masonry Grout.

1.03 REFERENCE STANDARDS

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

B. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

D. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2013.

E. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections; 2015a.

F. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric); 2015a.

G. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals; 2008 (Reapproved 2013).

H. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals (Metric); 2008b (Reapproved 2013).

I. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

C. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.

D. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).

B. Manhole Sections: ASTM D3753, glass-fiber reinforced polyester with integral steps.

C. Concrete: As specified in Section 03 30 00.

D. Clay Brick Units: ASTM C62, Grade SW solid units; nominal modular size of 2-1/4 x 3-5/8 x 7-5/8 in.

E. Mortar and Grout: As specified in Section 04 05 11, Type S.

F. Reinforcement: Formed steel wire, galvanized finish, wire diameter as indicated on drawings.

G. Concrete Reinforcement: As specified in Section 03 30 00.

H. Admixtures, General: Chemical type conforming to ASTM C494/C494M (wet mix only).

I. Air-Entraining Admixture: Conforming to ASTM C260/C260M (wet mix only).

2.02 COMPONENTS

A. Lid and Frame: ASTM A48, Class 30 Cast iron construction, machined flat bearing surface, removable lid, closed lid design; lid molded with identifying name. Manufactured by Capital Foundry of Virginia.

B. Manhole Steps: Formed galvanized steel rungs; 3/4 inch diameter. Formed integral with manhole sections.

2.03 CONFIGURATION

A. Shaft Construction: Concentric with eccentric cone top section; lipped male/female dry joints; sleeved to receive pipe sections.

B. Shape: Cylindrical.

C. Clear Inside Dimensions: As indicated.

D. Design Depth: As indicated.

E. Clear Lid Opening: As indicated.

F. Pipe Entry: Provide openings as indicated.

G. Steps: As indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.03 MANHOLES

A. Place concrete base pad, trowel top surface level.

B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.

C. Form and place manhole cylinder plumb and level, to correct dimensions and elevations. As work progresses, build in fabricated metal items.

D. Cut and fit for pipe.

E. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.

F. Coordinate with other sections of work to provide correct size, shape, and location.

3.04 MASONRY WORK

A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches.

C. Form flush mortar joints.

D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

E. Install joint reinforcement 16 inches on center.

F. Place joint reinforcement in first and second horizontal joints above base pad and below lid frame opening.

3.05 SCHEDULES

A. Storm Sewer Manholes: Precast concrete sections, galvanized steel steps, 60 inch inside dimension, to depth indicated, with bolted lid.

B. Electric Service Manholes: Prefabricated FRP sections, integral molded steps, 60 inch inside dimension, to depth indicated.

END OF SECTION

SECTION 33 14 16 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings for site water lines including domestic water lines and fire water lines.

B. Valves and Fire hydrants.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting.

B. Section 31 23 16 - Excavation: Excavating of trenches.

C. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

D. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

E. Section 33 05 13 - Manholes and Structures.

1.03 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

C. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

D. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2015.

E. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80; 2015.

F. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 1998 (Reapproved 2011).

G. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2017.

I. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2009.

J. AWWA C502 - Dry-Barrel Fire Hydrants; 2014.

K. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; 2010.

L. AWWA C606 - Grooved and Shouldered Joints; 2015.

M. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed County of Gloucester specified requirements.

D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with County of Gloucester, Virginia Department of Public Utilities requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

A. Manufacturers:
   1. As approved by County of Gloucester, Virginia Department of Public Utilities..

B. Ductile Iron Pipe: AWWA C151:
   1. Fittings: Ductile iron, standard thickness.
   2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with rods.

C. Copper Tubing: ASTM B88, Type K, annealed:
   1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
   2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.

D. PVC Pipe: AWWA C900 Class 150:
   1. Fittings: AWWA C111/A21.11, Schedule 40 per ASTM D2466 or schedule 80 per ASTM D2467.
   2. Joints: ASTM D3139 compression gasket ring.

E. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Water Service" in large letters.

2.02 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves 3 Inches and Over:
   1. Manufacturers:
      a. As approved by County of Gloucester, Virginia Department of Public Utilities..

2.03 HYDRANTS

A. Hydrants: AWWA C502, UL 246, dry barrel type.
   1. Manufacturers:
      a. As approved by County of Gloucester, Virginia Department of Public Utilities..
   2. 6 inch bell or mechanical joint inlet connection with accessories, gland bolts, and gaskets.

B. Hydrant Extensions: Fabricate in multiples of 6 inches with rod and coupling to increase barrel length.

C. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles, one pumper nozzle.

D. Finish: Primer and two coats of enamel in color required by utility company.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

A. See the section on trenching for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPE

A. Maintain separation of water main from sewer piping in accordance with County of Gloucester, Virginia Department of Public Utilities.

B. Group piping with other site piping work whenever practical.

C. Establish elevations of buried piping to ensure not less than 3 ft of cover.

D. Install pipe to indicated elevation to within tolerance of 5/8 inches.

E. Install ductile iron piping and fittings to AWWA C600.

F. Install grooved and shouldered pipe joints to AWWA C606.

G. Route pipe in straight line.

H. Install pipe to allow for expansion and contraction without stressing pipe or joints.

I. Install access fittings to permit disinfection of water system.

J. Slope water pipe and position drains at low points.

K. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 16.13.

3.05 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.

D. Set hydrants to grade, with nozzles at least 20 inches above ground.

E. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.

F. Paint hydrants in accordance with Section 09 91 13.

3.06 SERVICE CONNECTIONS

A. Provide water services to utility company requirements with water meters.

3.07 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with County of Gloucester, Virginia Department of Public Utilities standards.

B. Pressure test water piping to 20 psi.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 33 31 13 - SITE SANITARY SEWERAGE GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

C. Cleanout access.

1.02 RELATED REQUIREMENTS

A. Section 31 23 16 - Excavation: Excavating of trenches.

B. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 33 05 13 - Manholes and Structures.

1.03 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

A. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.

B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.

C. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2016.

D. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2017.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of sanitary sewerage pipe with size, location and installation of other service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe material and pipe accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed County of Gloucester requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:
   1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
   2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with County of Gloucester, Virginia Department of Public Utilities Standards.

B. Cast Iron Soil Pipe: ASTM A74, service type, hub and spigot end.

C. Joint Seals for Cast Iron Pipe: ASTM C564 rubber gaskets.

D. Ductile Iron Pipe: ASTM A746, Pressure Class 350, with cement-mortar lining and bell and spigot end.

E. Joint Seals for Ductile Iron Pipe: AWWA C111/A21.11; styrene butadiene rubber (SBR) or vulcanized SBR gaskets.

F. Plastic Pipe: ASTM D3034, Type PSM, Poly(Vinyl Chloride) (PVC) material; mimimum inside nominal diameter of 4 inches, bell and spigot style solvent sealed joint end.

G. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

PART 3 EXECUTION

3.01 GENERAL

A. Perform work in accordance with County of Gloucester, Virginia Department of Public Utilities Standards.

3.02 TRENCHING

A. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
   1. Plastic Pipe: Also comply with ASTM D2321.

C. Lay pipe to slope gradients noted on drawings.

D. Connect to municipal sewer system.

3.04 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with County of Gloucester, Virginia Department of Public Utilities Standards.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.06 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 42 11 - STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Connection of drainage system to municipal sewers.

C. Catch basins, Paved area drainage, and Site surface drainage.

1.02 RELATED REQUIREMENTS

A. Section 31 23 16 - Excavation: Excavating of trenches.

B. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 33 05 13 - Manholes and Structures.

1.03 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of drainage pipe with size, location and installation of other service utilities.

B. Preinstallation Meeting: Conduct a preinstallation meeting prior to the start of the work of this section; require attendance by all affected installers.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe material and pipe accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Project Record Documents:

1. Record location of pipe runs, connections, catch basins, manholes and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 REGULATORY REQUIREMENTS

A. Conform to HRPDC Regional Construction Standards, 6th Edition, VDOT Road and Bridge Specifications and as indicated on drawings for materials and installation of the Work of this section.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with HRPDC Regional Construction Standards, 6th Edition, VDOT Road and Bridge Specifications and drawings.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 31 23 16.13 - Trenching for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

C. Lay pipe to slope gradients noted on drawings.

D. Connect to building storm drainage system and foundation drainage system.

3.03 INSTALLATION - CATCH BASINS AND CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated.

E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection in accordance with Section 01 40 00 - Quality Requirements.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.05 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION